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and
AIRCRAFT ENGINEER

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The Outlook

A Doubtful Decision

THE decision to merge British South American Airways and B.O.A.C., announced by Lord Pakenham last Tuesday, is no more welcome for having been expected. Rumour had been busy for many weeks that such a step was contemplated as a result of the ban on the Tudor for carrying passengers.

That the position of B.S.A.A. has been rendered extremely difficult through the resulting lack of aircraft is undeniable, but less drastic steps might have been taken. If the shortage of aircraft is actually the chief reason for the merger, it is not very clear how matters are to be assisted by the absorption of B.S.A.A. into B.O.A.C. The fact of combining the two corporations will not in itself produce aircraft out of a hat, even if that hat is a very large one.

One would have thought that a more reasonable solution would have been for B.O.A.C. to lend B.S.A.A. some of the Canadairs when they become available, and when the former corporation gets its Stratocruisers it might have spared some Constellations for B.S.A.A. Doubtless there would be objections that this would upset the working of B.O.A.C., but there must be a certain amount of that in any case.

The late Air Commodore Brackley fought hard for the flying boat, and it was very largely due to him that the SR-45s were "saved." It is, perhaps, unthinkable that these boats could now be scrapped, but B.O.A.C. has never tried to conceal its dislike of flying boats, a dislike not shared by the passengers, and it would be childishly naïve to expect that flying boats will be given a fair trial under the new set-up. The combination corporation will, presumably, use them because it will have to, but there will be little enthusiasm at headquarters, whatever is the spirit at the operational terminals and among the crews who will be manning the large Saro "flying ships."

The Debit Side

DOUBTLESS it will be argued that the merger of the two corporations will result in economies. Some small saving may be possible in avoiding overlapping of booking and certain other facilities, but they will be insignificant in relation to the whole picture, and the price to be paid is likely to outweigh the advantages.

At the top, the two boards may be in fairly good agreement, and Mr. Booth will become equal joint deputy chairman with Mr. Whitney Straight. But one very much doubts that the amalgamation will be welcomed by very many outside the boards. There will undoubtedly be redundancies, although presumably B.S.A.A. will not be the sole sufferer in this respect.

But even if dismissals do not turn out to be on a very large scale, the fact that the number of corporations is to be reduced to two will lessen by that much the chances of good men making a career in British civil aviation. There will be less opportunity for getting varied experience, and if a man sees no prospect of advancement, there will be nowhere else for him to go. The result is likely to be that many good men will leave civil aviation and try to make their living in other spheres.

This was realized in the early days when nationalization was being planned. Mr. Ivor Thomas, when he was Parliamentary Secretary to M.C.A., explained that the reason for establishing three or more corporations was that it was desired to have flexibility, to provide different methods of approach to the problems, to avoid the risk involved in placing responsibility in the hands of one managerial group, and to encourage the competitive spirit. Those objects are as valid to-day as they were in 1945, but they appear to have been forgotten.

The decision to merge the two corporations will necessitate new legislation, but there is little doubt that this will be passed by Parliament.

Good News for R.A.F.V.R.

TWENTY years is a long time for any type of aircraft to remain in service, but that is, or will be, approximately the life span of the de Havilland Tiger Moth, which is now to be replaced by the same company's Chipmunk. The first batch of Tiger Moths was delivered to No. 3 Flying Training School at Grantham in 1931, at a time when the firm was still established in the very modest factory at Stage Lane, Edgware. At that time it could scarcely have been foreseen that some 9,000 of these small trainers would be built. Yet that was the number which had served to train *ab initio* pilots by the end of the 1939-45 war.

We have no figures relating to the number of pilots trained initially on the 9,000 Tiger Moths, but they must be impressive, and many a pilot who achieved fame during the war will recall with affection his early initiation on the "good old Tiger."

There is little doubt that the Chipmunk will come to be regarded with equal affection when it goes into service in the R.A.F.V.R. A period of a year or two must necessarily elapse before the new machine is in general use, and that is why we assess the life span of the Tiger Moth at about twenty years. We hope it will be even more than that, for as and when the old type is replaced by the new, there is an excellent opportunity to help the flying clubs by making them a present of any Tigers which are still serviceable or which can be made so.

The announcement that an order has been placed for Chipmunks will be hailed with satisfaction by the R.A.F.V.R. The fact that it is a low-wing monoplane means that it is not so sensitive to gusts, so that flying will be far less restricted by weather than it is with the Tiger Moth. The effect of this fact will be considerable, and should mean that the stipulated number of hours can more easily be put in during the limited time available to most V.R. personnel.

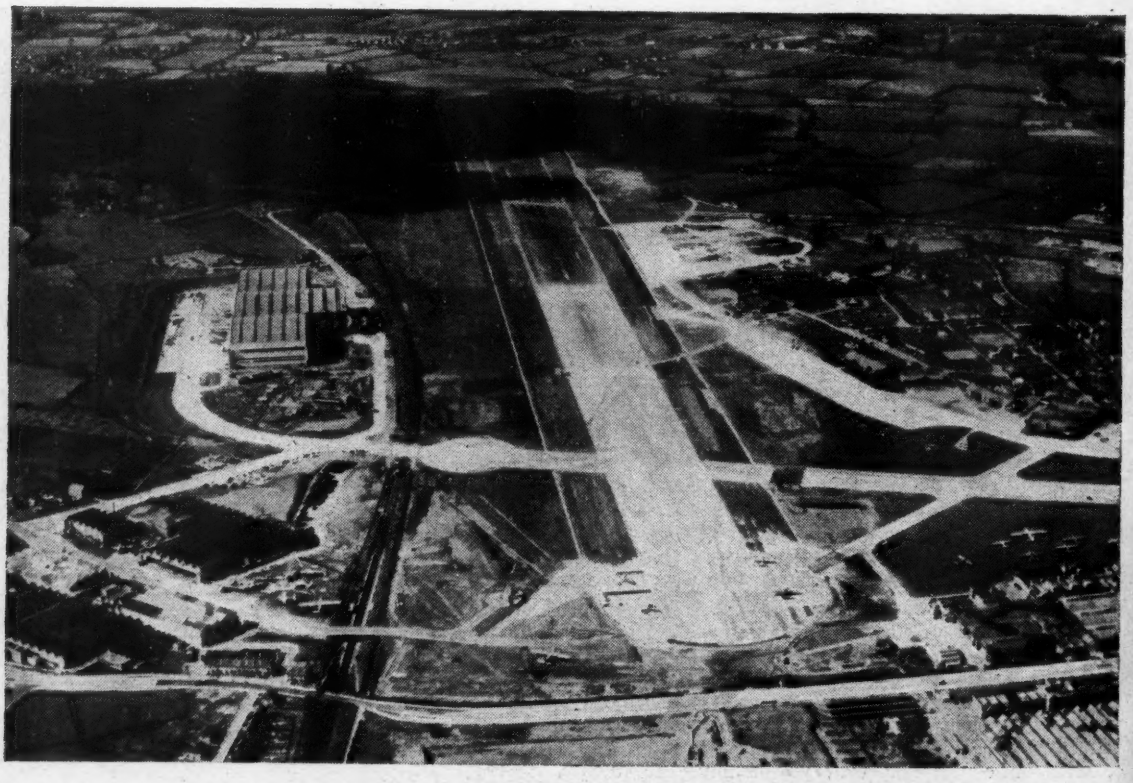
For initial training also the Chipmunk will have many advantages, with its more comprehensive equipment and wider scope. Performance, as such, is not especially important in a trainer but the better speed and climb of the Chipmunk compared with the Tiger Moth will mean that a greater number of "circuits and bumps" can be made in a given period thus saving valuable time.

Altogether it is good news that the Chipmunk has been ordered in quantities at last but the decision to do so might have been taken earlier.

CONTENTS

Outlook	301
Helicopter Progress	303
Here and There	306
Civil Aviation News	308
Dusting by Autocrat	312
No. 3 Fighter Squadron	313
Bomber Command Reunion	321
Civil Aviation Costs	322
More About Static	324
Air Safety Debated	326
Correspondence	328
Service Aviation	329

Forthcoming Events page 312



PATH OF PROGRESS: The vast proportions of the Filton runway are often assumed to indicate that the Brabazon will require a take-off run of inordinate length. In fact, it should clear the hypothetical 50-foot screen in a distance of 1,100 yards from stand-still. The 3,000-yard available run will, however, be required in May, when the "Brab" starts her taxying and acceleration trials. This splendid study was made by Aerofilms Ltd., to the order of the contractors, John Laing and Son, Ltd.

"Flight" photograph.

A spot landing by the Fairey Gyrodyne. The counter-torque airscrew is on the starboard wing-tip and the fairing on the port tip forms a battery container. Use of an orthodox tail gives the Gyrodyne a large measure of stability.

Helicopter Progress

Impressions of Flying in the Gyrodyne : Great Control Simplification : Some New American Types

WITHOUT any fuss or shouting, British helicopter manufacturers are quietly working on developing existing models and on projects for new types. Last week we recorded something of the experimental work which the Helicopter Unit of British European Airways is doing at Westwood, Peterborough, the operational base for the experimental night mail service between Peterborough and Norwich. One of Westland's Sikorsky S.51s has recently returned in the carrier *Vengeance* after a voyage to northern waters, where it landed on ice floes and generally comported itself well in the cold climate.

At Eastleigh the flying tests of the Cierva Air Horse continue in the able hands of Mr. H. A. Marsh. There are many details to be individually and collectively tried-out, and obviously the tri-rotor configuration, with its gears, transmission and controls, will present manifold opportunities of ascertaining how closely physical realization corresponds to theoretical prediction.

At Filton the development work on the Bristol 171 is accompanied by project work on the 173. Of this latter design the firm has said very little, but the S.B.A.C. announces in a news letter that this is a ten-seater powered by two Alvis Leonides engines. It is generally thought that before helicopters are permitted to fly over built-up areas they must have two power plants so that, in case of failure of one, the other can carry the machine to a safe alighting space. The Air Registration Board has been drafting helicopter regulations to govern the granting of Certificates of Airworthiness.

At White Waltham the Fairey Gyrodyne is under constant experimentation, for although it has already established a new world's speed record (124.3 m.p.h.), there is still room for many detail variations on the basic Gyrodyne

On March 7th the Postmaster General, Mr. W. Paling, was flown in the Gyrodyne. He is seen here with Mr. F. H. Dixon, pilot, and Major Wright, Fairey director.

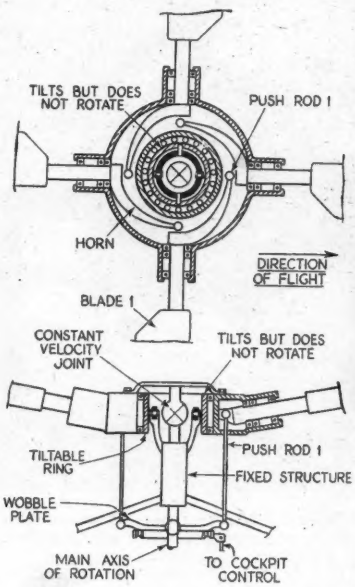
Helicopter Progress . . . . .

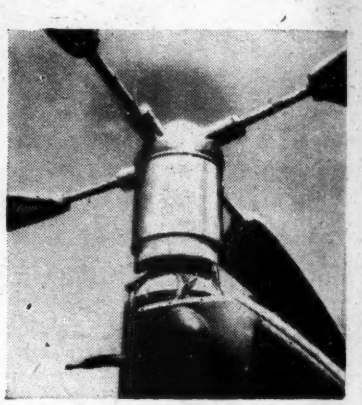
theme. It will be recollected that the second Gyrodyne was exhibited at Farnborough last year, although it was not permitted to fly. Since then it has carried many prominent people in quite exceptional Rumbold comfort. This machine will be at the Paris Aero Show in May.

The other day the Editor of *Flight* had the privilege of a flight in the prototype Gyrodyne, which does not quite compare for physical comfort with No. 2, as it is equipped for development exploration, but which was found to be something of an eye-opener in the matter of controllability, stability and performance.

The first impression on entering the second pilot's seat is that there is nothing but Perspex to keep one from falling forward out of the nose. That feeling, however, disappears as soon as one is strapped in and becomes accustomed to the quite remarkable field of view.

Our pilot on this occasion was Mr. F. H. Dixon, who showed patience in explaining the purpose of certain special instruments which would not be found in an operational model but are used in the very thorough testing which the machine is undergoing. It is obvious that a great deal of trouble has been taken to relieve the pilot of the need for excessive care in applying pre-flight cockpit drill. The engine is started by a press-button—two to be exact, the second looking after cold-weather starting. Once the engine is running smoothly, and the oil has warmed-up, all is ready for starting the rotor. This operation requires a delicate touch if the transmission is not to be strained, but in the Gyrodyne it is impossible for even the most ham-fisted pilot to do any damage. A centrally placed lever, which operates the clutch and rotor brake, holds the brake "on" when in the rearward position. Forward movement releases the brake and engages the clutch, but delayed-action automaticity makes it unnecessary for the pilot to advance the lever gently. He can, in fact, slam it forward quite roughly, and all that happens so far as the onlooker is concerned is that the tips of the rotor blades begin to move, almost imperceptibly at first, but with gradually increasing speed as the clutch picks up. How this is achieved will be explained when we come to describe the Gyrodyne in detail on some future occasion.





Diagrammatic representation of the Doman controls. The thrust bearings are unloaded in flight by hydraulic oil pressure. (Right) The Doman rotor is seen mounted on a Sikorsky R-6.

It now becomes necessary to say something about the controls. In the classic Sikorsky helicopter arrangement there are three: the pedals, the cyclic-pitch lever, and the collective-pitch lever. In the Gyrodyne the last-mentioned is replaced by a throttle lever, and in order not to depart too far from what has become standard in other helicopters, the throttle lever of the Gyrodyne is placed in the same position as the collective-pitch lever in most other machines. This lever has quite a large angular range, so that great delicacy in its use is not required. As the throttle is opened, the rotor gathers speed, and when the right revs have been attained, a further movement of the throttle lever increases the pitch collectively and the machine takes off.

This automatic action is achieved by having the blade hinges sloped in such a way that, as more power is applied, the combined movement about flapping and drag hinges gives the desired pitch increase. It is obvious that there is room for experiment in selecting the best combination. Originally, as Dr. Bennett explained in his lecture to the Helicopter Association last year, the flapping hinge was inclined at an angle of 60 deg in relation to the blade axis at zero torque. As torque was applied, this angle increased gradually to about 70 deg at full torque. Last week, when the writer flew in the Gyrodyne, some changes had been made, but they are outside the scope of these notes and are a part of the development programme.

During the take-off nothing unusual was observed. However, as soon as cruising height had been attained (we were to fly for a Dragon carrying photographers) and we had settled down to a steady cruising speed of about 110 m.p.h., the very real progress which the Gyrodyne represents became obvious. Gone was the pilot's tense watching of the rotor revs indicator and the firm—not to say clutching—grip of the controls. Instead, Mr. Dixon took his left hand away from the throttle lever and held the cyclic-pitch stick between thumb and forefinger. The day was a very gusty one, as became evident when the photographic Dragon came along to formate. It was wallowing and pitching quite a lot. The Gyrodyne, on the other hand, appeared to iron-out the bumps, and several times Mr. Dixon let go of all the controls for several seconds. On a calm day he could probably have done so for quite long

The McDonnel jet-powered helicopter "Little Henry" lifts two. The passenger is enjoying himself, but the pilot looks rather worried.

With the blades of its overlapping tandem rotors folded, the Piasecki HJP-1 will go down any carrier lift. It has been built for the U.S. Navy. (Right) Hoisting a stretcher case into the HJP-1.

periods. The machine did not "fall away" suddenly, as one would rather have expected. Evidently the use of an orthodox aircraft tail has been well worth while.

The view from the cockpit is remarkable, and it would be difficult to imagine a more pleasant way of "seeing the country." If a spot appears particularly attractive, one can "stop" to watch it at leisure, and if one has some way to go in order to reach interesting scenery, the Gyrodyne takes one there at a very useful cruising speed. Moreover, the thought that the rotor of this machine is always in the autorotative range adds considerably to peace of mind. In case of an engine stoppage, the Gyrodyne behaves, or can be made to behave, just like a Tiger Moth. At some 60 m.p.h. forward speed it has about the same rate of descent, and a normal flare-out landing can be made from the glide.

The writer stepped out of the Gyrodyne with a feeling that we have come a very long way since he first flew in the old Sikorsky R-4, which made a noise like that of a threshing machine, vibrated so that flying in it was like riding on a camel which had St. Vitus's Dance, and the cyclic-pitch stick of which shook as if with palsy. Those responsible for the policy of the Fairey Aviation Company are to be congratulated on their courage in launching this entirely private venture. The Gyrodyne can obviously be improved still further, but already there is proof that it represents a very important contribution to helicopter development.

American News

The almost feverish activity which characterized the American helicopter scene shows signs of slowing down somewhat. The tendency now seems rather towards steady development by the more firmly established designing concerns. News has just reached us that the Doman Helicopter Corporation of Danbury, Connecticut, has decided to go into production with a helicopter of its own design. It may be recalled that in his lecture to the Helicopter Association of Great Britain Major Siltanen referred to experiments being made with a Doman-Frasier hub mounted on a Sikorsky R-6 for test purposes. A feature of the Doman four-blade hub is that the blades have neither flapping nor drag hinges but are mounted on a constant-velocity gimbal joint. The blade thrust bearings can be "unloaded" by hydraulic pressure so that operating forces can be made very light. The controls are hydraulically operated and there is no feed-back into the stick. The blades are of wood, with a stainless-steel leading edge, and are very flexible, so as to bring the natural bending frequencies well below the exciting frequencies which occur in flight.

Preliminary estimates quoted by the firm indicate a loaded weight of 3,200 lb, with a disposable load of 1,400 lb. The engine is of 245 h.p., so that the power loading is about 13 lb/h.p. The disc loading has been kept low, which helps to account for the high useful load, although it will result in some loss of top speed. The simplicity of the rotor-head mechanism results in lower manufacturing costs, and it is expected that the LZ-2A will sell at $20,000.

In the last two issues we referred to the new Piasecki HJP-1 helicopter for the U.S. Navy. This machine is unusual in that it has overlapping tandem rotors, an arrangement which saves space on carriers. In addition, the blades are made to fold, so that this fairly large helicopter can be stowed in a relatively small space. The HJP-1 will carry five passengers, but is also equipped for carrying stretcher cases, and there is a power-driven winch by means of which ditched pilots, for instance, can be picked up from the sea. Three of these machines have been ordered, and two are now undergoing tests at the Naval Air Test Centre, Patuxent, Md.

Of other American news, mention may be made of the fact that the Hiller 360 is now in full production at the Palo Alto plant in California. The first commercial model was delivered recently to a Californian rancher, who will use it for crop spraying and similar work. The C.A.A. authorized maximum loaded weight is 2,248 lb, which leaves available 800 lb of disposable load. The Hiller 360, it will be remembered, has a small servo rotor which is controlled by the pilot and in turn controls the main rotor.

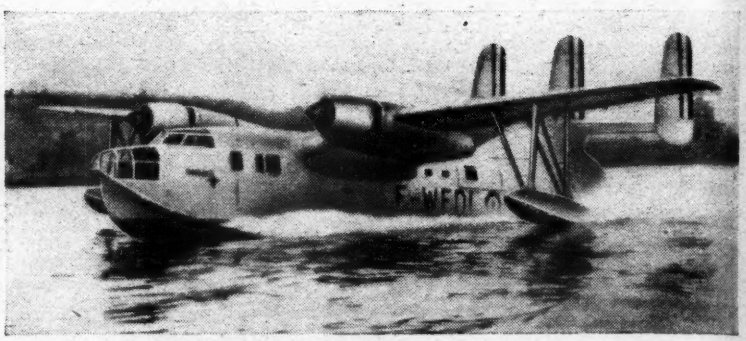
A BIG DAY AT WOODFORD

AS briefly recorded on page 330, the Avro Shackleton G.R.1 long-range reconnaissance aircraft for Coastal Command made its first flight on March 9th at Avro's Woodford airfield. The Shackleton is the fourth Avro prototype to be flown initially by Mr. J. H. Orrell, the previous three being the Tudor VIII, Athena 1 and Athena 2. Mr. S. E. Esler was co-pilot and Mr. A. Blake the flight engineer. The flight—of 33 minutes duration—was witnessed by Mr. W. S. Farren (technical director); Mr. S. D. Davies (chief designer); Mr. W. M. Taylor (project designer concerned with the Shackleton); and Mr. J. Rimmington (project engineer). Design of the Shackleton was initially undertaken by the late Mr. Roy Chadwick, whose work was completed by Mr. Taylor.

The Shackleton is the twelfth Avro prototype to be built during the past ten years, and the assembly and preparation of all these machines have been under the supervision of Mr. A. Bowers, manager of Avro's experimental department.

Weather for the Shackleton's baptism was hazy, visibility varying between 1½ and 3 miles. A 15-knot north-easterly wind blew straight down the long runway. After one preliminary taxying test, which had been preceded by three or four others earlier, Mr. Orrell checked all four Griffons individually and the Shackleton was airborne after a 14-sec run.

HERE AND THERE



MARITIME FRENCHMAN: The Nord 1400 reconnaissance flying boat, designed for the French Navy, recently made its first flight. Powered by two 1,600 h.p. Gnome-Rhone radials, it has an estimated maximum speed of 214 m.p.h.

R.Ae.C. Meeting

THE annual general meeting of the Royal Aero Club will be held at the club premises in Piccadilly on Wednesday, March 23rd, at 6 p.m.

Canadian National Exhibition

FEATURING products of some of the leading Canadian, British and U.S. manufacturers, a 14-day aircraft show is to be held at the Canadian National Exhibition in Toronto, from August 26th to September 10th inclusive. Ancillary equipment will also be displayed in the 30,000 sq ft of space available.

Missing Airmen

ALTHOUGH active search for the remains of 600 R.A.A.F. aircraft lost in the S.W. Pacific during the war has now been abandoned, planters and natives have been asked to look out for signs of wreckage in the islands north of Australia, and in the rough parts of Northern Australia. Of 1,500 personnel reported missing, only 22 were found to be alive as prisoners-of-war in Japanese hands. The fate of about 45 per cent of the missing men has been definitely established.

Comet Comment

THE de Havilland Aircraft Company recently pointed out that many recent references to the D.H.106 Comet jet airliner have been based on conjecture, and that categorical statements at so early a stage in the project would have a misleading effect.

Some indication of the aircraft's performance was, however, given by Mr. John Cunningham, chief D.H. test pilot, when he arrived in Sydney last Monday. He said that the Comet would probably be in service on the London-Sydney route in 1952. Flying at 35,000ft and about 500 m.p.h. it should complete the journey easily in two days; flying time would be about 36 hours.

Long-Range Bombing

LANDING at Fort Worth, Texas, after 43 hr 37 min in the air, a Convair B-36 bomber of the U.S.A.F. last weekend set up an endurance record for aircraft of this type For nearly 25 hr it carried a 10,000 lb bomb-load which it dropped in the Gulf of Mexico. Distance covered was over 9,000 miles non-stop, without flight-refuelling. Sufficient fuel remained for a further two hours' flying when the B-36 finally touched down at Forth Worth with two engines out of action.

Aircraft Golfers

THE Aircraft Golfing Society held its annual dinner in London last Friday evening. In the absence of the new president, Mr. Lestrade Brown (who was detained in America), the chair was taken by the captain, Mr. R. C. S. Johnson. The attendance numbered over 100. The first meeting of the season is arranged for Saturday next, March 19th, at the Verulam Club, St. Albans, when the Captain's Prize will be competed for.

R.C.A.F. Praised

AT the conclusion of his visit to the Royal Canadian Air Force, Gen. Nordenskiöld, C.-in-C. of the Swedish Air Force, expressed high regard for the quality of R.C.A.F. personnel and organization. He was especially impressed by its work with Vampires under Arctic conditions—work which is, of course, paralleled by the Swedish Air Force in both climate and equipment.

VISITING THE ORENDA: Watching a test-run of the A. V. Roe (Canada) Orenda turbojet: the Hon. Brooke Claxton, Minister of National Defence; C. M. Drury, Deputy Minister; Walter N. Deisher, vice-president, A. V. Roe (Canada), Ltd.; A. Cdre. L. E. Wray, C.O., R.C.A.F. Staff College; F. T. Smye, assistant general manager, A. V. Roe (Canada); M. Nix, manager, gas-turbine experimental department; and P. Dilworth, manager, gas-turbine design office.

R.Ae.S. in S. Africa

A SOUTH AFRICAN Division of the Royal Aeronautical Society has now been formed under the same conditions as those initiated in Australia and New Zealand last October. The new Division will have power to form branches and its members will all be fully registered with the Society.

Second Record

SUBJECT to F.A.I. confirmation, Captain Bill Odom has doubled his own 2,406-mile light aircraft record of two months' standing. On March 7th-8th he flew 5,000 miles non-stop from Honolulu to Teterboro, near New York, in a Beechcraft Bonanza, carrying a total of 288 gall. of fuel. The journey took 36 hr 1 min.

Flying Doctor Fined

DR. CLYDE FENTON, the Australian "flying doctor," was summoned recently for two breaches of the air navigation regulations at the Darwin Court, where he was forced to conduct his own defence as no defending counsel was available. He was fined £50 for flying an aircraft without a current pilot's licence, and £2 for not supplying the control officer with a plan or details of a flight from Darwin to bring in an injured patient. Fenton has 7,000 flying hours to his credit in 20 years as a pilot.

New Jet Fuel

AMERICAN jet aircraft are to use a new type of petrol in place of kerosene, thereby reducing crude-oil requirements. The U.S.A.F. claims that the new fuel, which has an octane rating lower than that of automobile fuel, will improve performance in cold weather and at high altitude. The use of normal 100-octane fuel in turbojet aircraft is not known to have involved any major operational problems, either in this country or the U.S., but the risk of fire in the event of a crash is, of course, greatly increased.

Supersonic Radio

THE U.S. Navy's Ordnance Test Station in California is now employing a mobile control trailer, capable of continuously receiving 60 simultaneous messages transmitted from a guided supersonic missile. Each of the two receiving stations of the trailer contains a galvanometer of 30-channel capacity for separating and recording information

HERE AND THERE

from the missile. It is reported that, except in special instances, the recovery of flight records after landing has not proved satisfactory.

Seagull Power

THE manufacturer's designation Supermarine 381 has been allotted to the Seagull amphibian. Alternative power units for the aircraft, which was built to the Naval Specification S.14/44 as a Walrus/Sea Otter replacement, and incorporates a variable-incidence wing, are the Rolls-Royce Griffon 21, 29 or 51.

Camera Contract

THE Royal Australian Air Force has placed a £50,000 order for air-survey cameras with the Williamson Manufacturing Company. A representative of the firm will advise the R.A.A.F. on maintenance and installation of the cameras for its increased survey programme.

Short Appointment

A FORMER Naval pilot, Mr. Michael Crosley, has been appointed a test pilot to Short Brothers and Harland, Ltd., of Belfast. Mr. Crosley, who is 28, was awarded the D.S.C. and Bar during the war, and at one time commanded a squadron in H.M.S. *Implacable*.

Mr. Michael Crosley.

He attended courses at the School of Naval Air Warfare and at the Empire Test Pilots School, and was attached for over a year to the A. and A.E.E., Boscombe Down, for test and development flying.

Free Sample

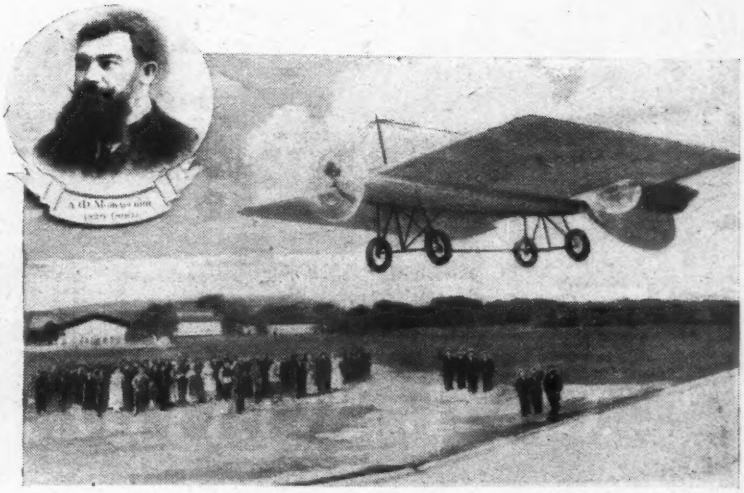
CURRENT advertisements of the Ryan Aeronautical Company invite prospective buyers of their 1949 Navion to take a free trip in the aircraft, without obligation.

Another Duster

AN American counterpart to the crop-spraying and dusting Autocrat described on p. 312 has been announced by the Luscombe Corporation. Their new 90 h.p. Silvaire conversion features insecticide tanks built into the wings and provision of a special stall-warning indicator as standard equipment—a form of instrument that in certain circumstances is essential for this work.

Liquid Asset

OUR U.S. contemporary *Flying* records what is probably one of the strangest transactions in private aircraft ever to take place. Mr. A. G. Talbert, of Illinois, bought a Grumman Widgeon which had been at the bottom of a Minnesota lake for eight months, and located it after a two-week search with a rubber dinghy. The Widgeon was finally hauled out of the water and serviced with spare parts and equipment brought in by air. Then it left the lake under its own power for complete reconditioning.



LIFTING THE IRON CURTAIN: At an exhibition in Moscow purporting to depict the work of Alexander Mozhaisky the astounding claim is made that he not only designed and built this steam-driven aircraft but that he flew it on July 20th, 1882. The artist's impression, alleged to have been prepared from the inventor's blueprints, seems to tell a somewhat optimistic story. Two steam engines, with boiler and transmission to three airscrews, might have lifted the machine into the air; but would so clever an inventor have braced his wings with "compression" wires?

R.Ae.S. Garden Party

BY arrangement with the Ministry of Supply and the Fairey Aviation Company, the Royal Aeronautical Society is holding its annual garden party at White Waltham airfield on Sunday, May 8th.

Air Anniversary

THE manager of B.O.A.C.'s No. 4 (Flying Boat) Line at Hythe, Capt. H. W. C. Alger, who has flown over two million air miles, recently celebrated his "coming-of-age" in civil aviation. It is 21 years since he joined the company's predecessor, Imperial Airways.

D.H. Entry for N.Z. Race

THE first entry for the England to New Zealand Air Race, to be held in 1953 to celebrate the centenary of the province of Canterbury, has been made by de Havilland. When the conditions are made known the firm will decide what type of aircraft to enter.

A Sweeping Advance

A WING with adjustable sweep-back has been designed by the N.A.C.A. to enhance the efficiency of high-speed aircraft in varying conditions of flight. A projected Lockheed fighter is reported to embody such a wing, recalling a Blohm and Voss design in which the wing was pivoted to give the effect of variable sweep-back without alteration of the centre of lift.

News in Brief

AMERICAN air and ground crews are to receive the "Berlin Air Lift Clasp," for 90 consecutive days' work since the operation began last June.

* * *

The lecture which was to have been given to the Helicopter Association of Great Britain by A. Cdre. W. H. Primrose on March 26th has been cancelled.

* * *

A Bill to provide a radar screen around the whole of North America, at a cost of £40,000,000, was approved by the U.S. House of Representatives last week.

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A recent step taken by the Air Ministry to improve Reserve and Auxiliary recruiting is the addition of eight Press officers to its present complement of ten.

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The Anglo-American Oil Co., Ltd., announces the appointment of Mr. D. Airey as manager of the Esso aviation department. Mr. R. B. Benwell, whom he succeeds, becomes manager of the Company's agricultural department.

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Mr. Leonard Taylor has ceased to be editor of the *Air Reserve Gazette*, which he founded some years ago under the title of *Air Training Corps Gazette*, and is now handling technical advertising accounts for C. P. Wakefield, Ltd., 185, Fleet St., London, E.C.4.

CIVIL AVIATION NEWS

SUBSTITUTE FOR MALTA : *The main runway at Ciampino Airport, Rome, is 2,400 yd long and parallel to it is a spare runway of pierced steel plate. B.O.A.C. made Rome a night stop on the Australian route as from December 1st, and also make it a night stop for the weekly York service to Teheran. In this photograph a British European Airways Viking is seen taking off.*

New British Pilots' Licences and Aircraft Regulations : I.A.T.A. Clearing House Successful Year : A Heavier Constellation

I.C.A.O. MEETING IN LONDON

THIRTY or more delegations from Colonial, Commonwealth and foreign Governments have been invited to attend the I.C.A.O. African/Indian Ocean Regional Air Navigation Meeting in London on March 22nd. Contracting States will be asked to determine the airfields, and ground facilities which should be provided for international air transport services crossing Africa and the Indian Ocean. The meeting is being held at Park House, 24, Rutland Gate, and is expected to continue until the middle of next month. Those delegates who have time and wish to see airfield communication and navigation equipment being made in this country will be invited to take the opportunity offered for inspecting it at the various manufacturers' premises. Invitations have also been sent to other States who might be interested and also to the international organizations: F.A.I., I.A.T.A., International Met. Org., International Telecommunications Union and the United Nations.

NEW CIVIL REGULATIONS

A COMPLETE edition of the revised British civil aviation code of law known as the Air Navigation Order and Regulations was made available last Monday, March 14th. The Air Navigation Order, 1949, Air Navigation (General) Regulations, 1949, and Air Navigation (Radio) Regulations, 1949 will replace the Air Navigation (Consolidation) Order, 1923 and Air Navigation Directions, 1936 and all the amendments.

The new Order and Regulations provide for the introduction, on April 1st, of the new Pilots' Licences announced in *Notices to Airmen* Nos. 255 and 358 of 1948. In order to allow time for pilots to comply with the new requirements holders of "B" Licences will be able to renew them up to June 30th, 1950. Learner pilots who, under the old regulations, were permitted to make practice flights without a licence will be required to obtain a Student Pilot's Licence before flying solo for which the only requirements will be a medical examination, and to have attained the age of 17. The holder of such a licence will not be confined to flights within three miles of an airfield but, when authorized by a flying instructor, will be permitted to fly anywhere in the U.K. Present holders of "A" Licences will, on application for renewal of their current licences, be issued with a Private Pilot's Licence with an aircraft-type rating. For the purpose of rating, the Ministry will require to see log-books It is understood that all flying clubs will receive instructions on procedure before April 1st.

Included in the new Order and Regulations are also the technical standards and procedures adopted by the International Civil Aviation Organization, which make it compulsory, as from April 1st, for all aircraft making scheduled journeys to carry radio. New performance requirements for all aircraft engaged on freight or passenger-carrying commercial flights are also introduced. It is understood that the latter regulations have been designed to prevent flights of a kind that would obviously be outside the range and capacity of the type of aircraft employed and to ensure as far as possible that in an emergency an aircraft would either be able to make a forced landing or reach the nearest airfield, or, if over the sea, to reach the nearest land. Regulations lay down, for example, that aircraft intended for flights over water of more than 90 minutes' flying distance from the shore must be able to maintain a height of 5,000ft with one engine inoperative. Aircraft which cannot fly for more than 30 minutes at 5,000ft with one engine inoperative must carry full dinghy equipment when flying over water.

NEW B.E.A. ROUTES

B.E.A.C. state that, as recently announced, services will be introduced to link north and south Wales and also Manchester, Birmingham and Paris. The former services, flown with D.H. Rapides, will start from Liverpool and fly to Cardiff via Hawarden in the morning, returning via Hawarden to Valley in the afternoon. The following day it will reverse the process and terminate at Liverpool.

Although the service is primarily intended to link north and south Wales, by including Liverpool B.E.A. are also providing direct communication between Liverpool and Cardiff.

CLEARING HOUSE TRANSACTIONS

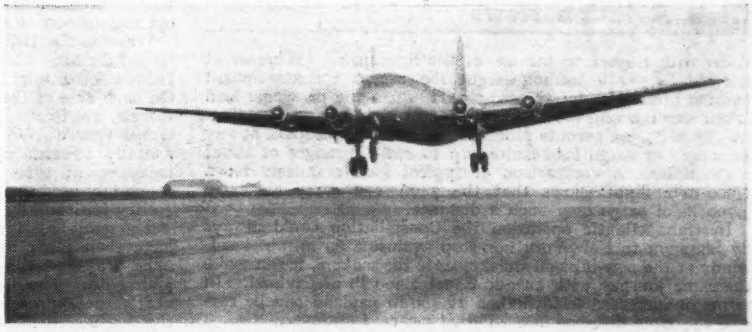
DURING 1948 the I.A.T.A. Clearing House in London handled a turnover of $124,000,000, compared with $52,400,000 in 1947. Commenting on these figures, Sir William Hildred, Director-General of I.A.T.A., states that the Clearing House makes it possible for the airlines to offer the public inter-line bookings through different routes to virtually all parts of the world with efficiency, economy, and security against the risk of currency inflation. Airlines which sell transport over each other's routes in various currencies use the I.A.T.A. Clearing House to offset their respective monthly balances after they have been converted into either dollars or sterling. Settlement is thus reduced to a single payment to or by the Clearing House in one currency or other. In this manner 78 per cent of the 1948 transactions were cleared by offset while cash payments of only $13,640,000 were required to settle the year's accounts.

Mr. A. J. Quin-Harkin, manager of the Clearing House, states that individual airlines' monthly accounts are on occa-

sion cleared by cash payments of as little as one-quarter of one per cent of the total transactions with other lines. By such deductions of the bulk amount on which exchange premiums must be paid, members had saved as much as $30,000 during the year. Monthly clearings were completed within an average of 43 days during 1948.

A feature of the transactions in 1948 was the protection of members against substantial losses on two months' transactions in French francs when that currency was devalued in January. The resultant saving to members—of which there are 34—was more than three times the annual cost of operating the Clearing House. The London branch also handles accounts between international lines and U.S. domestic operators, and clearances between Chicago and London have averaged about $200,000 per month since the relation was established in May, 1948. Transactions arising from the Universal Air Travel Plan are also cleared through the Clearing House.

Transactions during December, 1948, totalled $13,399,000 turnover, of which 81 per cent was cleared by offset and the remainder by cash payments of $1,251,000. During December, 1947, a turnover of $6,216,000 was recorded, with 74 per cent offset and $807,000 in cash settlements.



SHORT HOP: The French S.E.2010 recently flew for about 500 yards along the runway at Toulouse-Blagnac. The flight was not extended, since a considerable amount of equipment had still to be fitted.

STEPPED-UP CONSTELLATIONS

SOME remarkable improvements in performance as between the standard Model 749-79 Constellation and the 749A-79 have been issued in the form of a detailed analysis by Lockheed Aircraft Corporation. The difference between the two marks lies in the fact that the 749A has the new Curtiss 830 airscrews, whereas the 749 has type 850. The new airscrew has paddle or square-tipped blades and a number of modifications in the hub.

Maximum take-off and landing weights of 102,000 lb and 84,500 lb respectively have been increased to 107,000 lb and 89,500 lb. In terms of long-distance operation from Great Britain, claim Lockheed, this represents typical payload gains of:—

20 to 33 per cent to North America.
19 to 64 per cent to South America.
27 to 40 per cent to the Far East.

On shorter hauls the improved performance is of greatest

British Airways' Operating Statistics for November, 1948

	B.E.A. All Divisions	B.E.A. Continental Division	B.E.A. British Division	B.O.A.C. All Divisions	B.O.A.C. Western Division	B.O.A.C. Eastern Division	B.S.A.A.
Passengers carried	22,262 (26,379)	7,729 (9,766)	14,533 (16,613)	10,059 (8,431)	2,372 (2,158)	7,687 (6,273)	1,698 (1,265)
Cargo carried :							
Mail (tons)	177.1 (128.0)	90.5 (50.2)	86.6 (77.8)	138.7 (150.4)	24.4 (26.5)	114.3 (123.9)	19.7 (14.4)
Freight (tons)	346.5 (249.0)	273.7 (194.9)	72.8 (54.1)	300.8 (165.6)	54.6 (23.7)	246.2 (141.9)	43.1 (62.1)
Average load :							
Passengers (No.)	10.7 (10.5)	12.3 (13.7)	8.7 (7.2)	14.2 (11.1)	24.8 (22.2)	13.2 (9.5)	10.2 (10.6)
Total (lb)	2,718 (2,427)	3,292 (3,329)	1,783 (1,397)	4,409 (3,605)	5,763 (5,838)	4,238 (3,288	3,870 (4,362)
Average capacity :							
Seats (No.)	17.5 (17.2)	20.1 (20.6)	14.1 (13.7)	23.0 (18.5)	42.3 (43.7)	21.1 (14.9)	19.8 (21.4)
Total (lb)	4,313 (3,952)	5,188 (4,706)	2,888 (3,091)	7,361 (5,734)	9,683 (11,521)	7,068 (4,913)	7,282 (7,306)
Average Length of Haul :							
Passenger	277 (291)	505 (513)	151 (162)	3,018 (3,046)	2,232 (2,895)	3,222 (3,100)	2,533 (3,704)
Mail	434 (371)	704 (745)	151 (129)	4,624 (3,985)	3,347 (3,502)	4,897 (4,089)	5,019 (5,523)
Freight	544 (590)	643 (710)	169 (158)	3,563 (3,637)	2,880 (3,115)	3,715 (3,724)	4,941 (5,239)
Hours flown :							
Revenue : passenger services	4,163 (5,171)	1,917 (2,188)	2,246 (2,983)	10,786 (11,603)	737 (1,201)	10,049 (10,402)	1,989 (2,141)
cargo services	492 (347)	492 (347)	— —	1,240 —	398 —	842 —	68 —
charter and special flights	91 (64)	9 (27)	82 (37)	276 (826)	— —	276 (826)	174 —
Non-revenue	145 (244)	63 (88)	82 (156)	1,361 (1,914)	337 (722)	1,024 (1,192)	218 (55)
Equivalent annual utilization (revenue hours flown) per aircraft	778 (915)	777 (1,122)	780 (792)	1,312 (1,390)	— —	— —	1,203 (1,599)
Unduplicated route miles in operation at end of period	13,781 (13,736)	10,980 (9,035)	2,801 (4,701)	63,768 (56,642)	8,523 (7,748)	55,245 (48,894)	23,374 (23,168)
Percentage regularity	77.8 (93.9)	55.2 (89.8)	88.5 (95.3)	99.2 (99.7)	94.3 (100.0)	99.9 (99.7)	99.1 (97.0)
Average length of stage flights (miles)	169 (182)	421 (403)	95 (118)	991 (915)	1,066 (1,248)	982 (882)	985 (1,186)

TRAFFIC and operating statistics of the three British Airways Corporations for November, 1948, reflect the seasonal decline in traffic and the effect of winter schedules. B.O.A.C. operations were further curtailed as a result of the move of the Corporation's Western Division headquarters from Dorval, Montreal, to Filton, Bristol, while the ten-day strike at Northolt, followed by three days of severe fog, reduced regularity on the B.E.A. Continental routes to 55 per cent. An increased amount of freight was carried by B.O.A.C. and B.E.A., in particular by the former, which moved over 300 tons. These were the highest figures since the exceptional period at the end of the war, when large quantities of military stores were being transported. The figures given in brackets are those for the corresponding month in 1947.

Civil Aviation News . . . . .

value with respect to the use of the Speedpak. Whereas at the old 84,500-lb landing-weight the use of the attachment became profitable, for the most part, when the passenger-load factor was low and the cargo-load factor high, the new landing-weight of 89,500 permits profitable use of the Speedpak, at any passenger or cargo load-factor, up to still-air ranges of about 2,200 miles. A comparison of typical load manifests for a 1,900-mile flight shows that the 749A can carry an extra 3,700 lb of cargo over such a distance.

In trans-Atlantic operation the Constellation could always fly Shannon to New York non-stop against a 60 m.p.h. head-wind; at the new-take-off weight, state the makers, it can make the same journey with an additional 2,400 lb of payload. In terms of increased headwind, a 12,400-lb payload can be carried the same distance in a wind 44 per cent stronger.

The analysis also covers operation from high-altitude airports. Under such conditions, and taking temperature into account, typical figures claimed for the 749A are a 12 per cent increase of payload or, for same load, approximately 22 per cent less runway.

Similarly, at 107,000 lb the aircraft can take off at a temperature 20 deg above standard, as compared with 102,000 lb at standard temperature.

"SLOPE-LINE" APPROACH

SOME details of the so-called "slope-line" visual-approach system shortly to be installed at Idlewild and, initially, twelve other major American airports, are now available. It would appear that, except in constituting a visual lead-in offering guidance as to correct course and height by the pattern formed by the lights, the system bears little resemblance to its British counterpart developed at Farnborough and now in operational use at London Airport.

Whereas the British system is based on an arrangement of lateral distance bars across a central line the U.S. installation follows what might be described as a herring-bone pattern. On each side of the approach-line to the runway, at 100ft intervals, are thirty steel bars, each 14ft in length and carrying lamps spaced 10in apart. The lamps, which are set horizontally towards approaching aircraft, are of the 250-watt incandescent type in "sealed-beam" reflectors of the kind commonly used in the newer cars; they have a spread of about 40 deg horizontally but only 8 deg vertically.

The lamp-bars themselves are not mounted horizontally, but have their inner ends elevated at 45 deg so that imaginary lines projected through them would intersect on the correct glide-path. The fact that the bars are placed progressively nearer the approach-line in the direction of the runway means that, while maintaining the 45-deg angle, they continue to point accurately towards the glide-path throughout the 1,000-yd approach.

A pilot making a correct approach will see the sixty individual lines of light blended into two continuous lines leading in a smooth perspective to a vanishing point at the commencement of the runway. If he is too high or too low, or laterally off his path, the lines will appear broken into characteristic patterns which will immediately give the clue to his fault.

It is stated that the system, which has been developed with the close co-operation of the C.A.A., has been approved by a U.S.A.F.-Navy-Civil Committee for standard adoption at 180 airports and airfields throughout the country. As stated above, twelve airports are being equipped immediately, and the order in which they are converted will depend on the obsolescence or otherwise of their present arrangements. Original cost is estimated at £12,500 per installation.

BREVITIES

LORD DOUGLAS of Kirtleside was due to take up his appointment as the new Chairman of the British European Airways Corporation on Monday, March 14th. Mr. J. V. Wood, the managing director, is still on sick leave.

* * *

Traffic returns for January show that B.E.A. carried 27,566 passengers on all routes. This shows an increase of 5,000 over the same month last year but the route mileage is very slightly less. A significant figure is the amount of freight carried, which at more than 296 tons is nearly twice that in January last year.

American Overseas Airlines have taken delivery of the first of five Stratocruisers and the inaugural flight to this country is planned for August 19th. From that date to the middle of September two services a week will fly, but after that date the company will operate daily flights. Bookings for the Stratocruiser service are already being made.

* * *

B.E.A., in conjunction with Cyprus Airways, an associate of the Corporation, and Goodmos Tours, has arranged to fly parties of Jews from London to Lydda and back to attend the Passover and other Jewish feasts during the spring and summer. Cyprus Airways will carry the passengers on the last stage of the journey from Cyprus.

* * *

During February Trans-Canada Air Lines carried, in addition to heavy passenger-loads, over 18 tons of cargo across the Atlantic from London and Prestwick to Canada, America and the Caribbean. This figure is almost double the January load and treble the load carried in February, 1948, on westbound flights. Cargo loads were also heavy on eastbound flights during February this year, and over 12 tons were flown from Montreal to London and Prestwick.

* * *

British European Airways have equipped a special trailer as a travelling exhibition. It has an interior display of illuminated maps showing B.E.A. Continental and British air routes, and there are photographs of the cities and towns to which the Corporation operates, together with detailed models of the Viking aircraft. Until March 19th the trailer will be in Horse Guards Parade, London, after which it will tour the country.

* * *

B.O.A.C. have increased the frequency of Constellation services between the U.K. and Australia to three a fortnight in each direction. Previously there was one a week between London Airport and Sydney. Services now leave London Airport each Wednesday and alternate Fridays, while the return service leaves Sydney on Wednesdays and alternate Saturdays. The journey of 12,000 miles takes just over five days, with night stops at Rome and Singapore.

* * *

As a result of decisions made at the meeting of the South Pacific Air Transport Council in New

NEW PLAN: At Mascot, New South Wales, the Australian international airport, a two-runway scheme is replacing the original four-runway plan. Superimposed on a photograph of the existing airport is the new scheme with the course for the diverted Cook's River shown by a dotted line on the left. White patches indicate where the river has already been filled in.

Civil Aviation News .....

Zealand last December the Australian Federal Government has agreed to pay about one-third of the construction cost of an international airport at Suva Point, Fiji. The remainder will be paid by the United Kingdom and New Zealand. The airport will be one of the main stopping-places on the Pacific route between Australia and North America.

* * *

The first post-war congress of the Institute of Transport is to be held at the Palace Hotel, Buxton, from June 22nd to 24th inclusive. The programme will consist of two papers—"The Team Spirit in Industry," by Mr. J. Benstead, and "The Philosophy of Transport," by Mr. R. Birch—and a number of visits to industrial establishments. Sight-seeing tours will be arranged for the ladies and each evening social functions will be held.

* * *

Olley Air Services, Ltd., will operate day-return flights to all the principal race meetings this year, beginning with the Lincolnshire Handicap. Timetables have been arranged to allow passengers to leave London mid-morning and return in the late afternoon. Record bookings are expected for the Grand National at Liverpool, for which meeting passengers will leave London at 1030 hr and return at approximately 1830 hr.

* * *

It is reported from Bombay that Jamnagar Airport, on the north coast of the Kathiawar Peninsula, is to be developed by the Government of India to international standard for the benefit of air traffic to north and east India and the Far East. At present all eastbound aircraft land at Bombay or occasionally Ahmedabad, but it is considered that Jamnagar, in addition to saving 200 miles, would be more convenient.

FAR-EAST BOTTLENECK: Operations into Hong Kong by large land-aircraft are limited by the size and position of Kai Tak airport. B.O.A.C. operate one Plymouth a week to Hong Kong and one through to Japan. It is probable that Canadairs will be found suitable for this service.

* * *

Owing to renovation work on the runway at Deurne Airport, Antwerp, Sabena services between London and Antwerp were suspended on March 7th for approximately a month. Passengers for Antwerp are being carried by coach from Brussels, an hour's journey. Passengers leave London Airport at 1400 hr, arriving at Melsbroeck Airport, Brussels, at 1620 and Antwerp at 1750. On the return flight passengers leave Antwerp at 0730 hr and reach London Airport at 0940.

FROM THE CLUBS

DURING the spell of fine weather in the New Year, the four Tiger Moths and three Hornet Moths belonging to the London Aeroplane Club have been continuously in use. During January 111 hr 50 min were logged, with two first solos, and during February 108 hr 30 min included six qualifications for "A" licences.

* * *

MEMBERS of the Redhill Flying Club flew rather more than 100 hours in February, during which period there were four *ab initio* solos. During the past eight months a total of 1,180 hours have been flown.

The airfield is unfortunately still on the "prior permission only" list, as the wire mesh laid during the war for the benefit of heavy aircraft is damaging to Tiger Moth tail-skids. Contractors are in the process of removing it and it is hoped by early spring the airfield will be completely cleared of this hindrance to flying.

There will be an "At Home" on Saturday, July 9th, but in the meantime the club welcomes visitors, who should obtain prior permission and land on the serviceable part of the airfield. The annual general meeting on April 9th will be followed by a buffet dance.

* * *

AT the Shirehall, Worcester, on Thursday, March 3rd, Mr. G. S. Lindgren and G/C. C. A. Wilcock attended the Worcester Aero Club's inaugural ball. The Parliamentary Secretary unveiled a three-bladed airscrew, which, taken from a Battle of Britain Hurricane, had been presented to the Club by Rotol, Ltd., of Gloucester. Earlier in the afternoon Mr. Lindgren had been received by the Mayor of Worcester and inspected a guard of honour of No. 187 Squadron of the A.T.C.

Other guests at the ball included the Mayor of Hereford and the Mayor and Mayoress of Gloucester, all of whom were welcomed by the chairman of the club, W/C. Shakespeare, M.C., A.F.C. Mr. Lindgren remarked that it was the first time in many flying-club inauguration ceremonies which he had attended that the club had aircraft, gliders, instructors and members, but had no airfield; he hoped that before long the Worcester Club would be in a position to fulfil its flying activities.

The Mayor of Hereford said he fully recognized the value of the affiliation of members of Hereford and Worcester Aero Clubs and he was happy that for the past two years Hereford had been able to provide the necessary facilities for air transport, flying instruction and gliding. He hoped that before long the Worcester Club would be able to provide equal facilities for their own city.

* * *

WITH considerable enthusiasm cross-country flying is being practised by members of the Derby Aero Club in preparation for the various Continental tours which are planned for this summer. Twenty-four members have entered for the Deauville Rally on Saturday, July 2nd and 14 of them will fly on to Barcelona on the following Monday to take part in the Spanish Air Rally. Thirty members of the Aero Club de Belgique have accepted an invitation from the chairman and committee of the Club to attend a garden party at Derby on June 11th.

With the arrival of another Auster, the property of Mr. S. W. Freestone, the number of private owners has been increased to 11. A party has been organized to take place in the club-house on Saturday, March 19th, and for March 23rd a cross-country has been planned to Woodley Aerodrome, where transport will convey members to the "French Horn" at Sonning for lunch.

* * *

FAIROAKS FLYING CLUB recently tried the experiment of reducing dual charges to those for solo, with the interesting result that members have logged more dual than solo flying. Before the reduction it was unusual for pupils to take further instruction after reaching "A" licence standard, on account of the higher cost, but with this latest encouragement there will undoubtedly be an improvement in the quality of flying.

The club now has 300 members, including nine private owners, of which three own two aircraft each. There are seven part-time instructors for the three Tiger Moths, one D.H. 60G and one Magister—on which the rates are £3 per hour dual or solo.

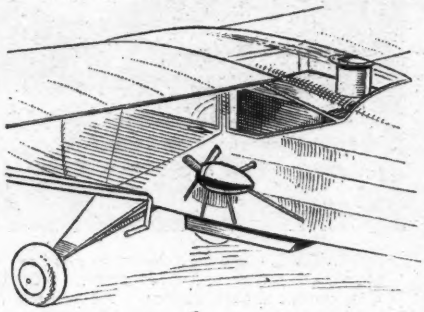
Flying hours for January and February this year were 188, a considerable increase over the figures for the corresponding months in 1948; total hours last year amounted to 1,357. Twenty-seven members qualified for "A" licences during 1948 and a further seven have qualified this year

DUSTING BY AUTOCRAT

New Auster Variant for Soil Fertilization and Pest Control

EXPERIENCE at home and abroad in the past few years has shown that the work of crop-dusting and spraying and pest control can be efficiently undertaken by both helicopters and fixed-wing aircraft of suitable performance.

A prospective operator of the latter type of machine equipped for such duties will inevitably demand that it should possess an equal measure of economy, simplicity and durability. That these vital virtues are an inherent quality of the well-tried Auster series will be attested by many private owners and flying clubs, so that an Autocrat adapted by Auster Aircraft, Ltd., for spraying or dusting should constitute a most suitable offering for a market that is probably world-wide.



The disposition of the hopper, windmill, and —under the floor—venturi are apparent in this sketch of the Autocrat "duster."

The design differs from the standard Autocrat mainly in its specialized equipment, of which two types are available. The Auster "duster" will carry between 300 and 400 lb of insecticide or fertilizer powder, according to density, in a hopper behind the dual seats. A windmill fitted to the port side of the fuselage operates agitators inside the hopper through reduction gearing. The amount of powder dispersed can be regulated from the cockpit through a sliding-gate valve in the simple venturi which shrouds the cabin-floor orifice. When D.D.T. powder is spread at the quoted minimum rate of ½ lb per acre, a single flight can thus give protection to as much as 800 acres.

For areas where liquid-dispersal is considered desirable, on either crops or malaria-infested swamps, the spray-equipped model has been developed. A windmill-driven pump, in an installation similar to that of the dusting version, transfers insecticide from the 40-gall cabin tank to a 14ft spray-tube mounted horizontally beneath the fuselage. Ten jets are fitted—calibrated according to the viscosity of the liquid—and give a mist which is deposited in a 70ft-wide swathe. During the company's development tests up to three acres have been covered by one gallon, although this amount can be increased.

Equipped for spraying, the Autocrat delivers a 70ft-wide mist on crops or swamps.

Delivery within six weeks is quoted for both types of Autocrat. With dusting installation, the aircraft is priced at £1,470, and the spraying version costs £25 more. Powered by a 100 h.p. Cirrus Minor II, the Autocrat has a maximum speed of 120 m.p.h. when flying at an all-up weight of 1,700 lb. As it cruises at 100 m.p.h. and stalls at 28 m.p.h., it will be seen that crop-protection is greatly facilitated by a wide speed-range. Two versions of the more powerful J/5 (130 h.p. Gipsy Major I) are alternatively available, with correspondingly greater powder or liquid capacity.

It is appropriate here to summarize briefly the main features of current Auster aircraft. General application of the heading "Auster" to each of the firm's separate aircraft types, such as the Avis and Arrow, or the various A.O.P. marks, has possibly obscured the fact that they differ considerably in power, performance, equipment and capacity. Leading particulars of the present civilian models are as follows:—

AUTOCRAT: A three-seat aircraft originally known as the J/1, powered by a Cirrus Minor II. Take-off distance at 1,850 lb all-up weight, 212 yd; disposable load, 792 lb; range, 320 miles.

ARROW: Two-seater with a 75 h.p. Continental horizontally opposed engine. All-up weight 1,450 lb, of which 578 lb are disposable. Speeds: max., 98 m.p.h.; cruising, 87; stalling, 37 m.p.h. Take-off run 150 yd; range 320 miles.

J/4: More powerful version of the Arrow, having a 90 h.p. Cirrus Minor I.

AVIS: Changed fuselage structure allows four seats for charter or business work; available also as an ambulance. Gipsy Major 10 of 145 h.p. gives max. speed of 113 m.p.h. Avis stalls, with flaps down, at 40 m.p.h. All-up weight is 2,550 lb, with 1,070 lb disposable load. A range of 500 miles at all-up weight is specified.

J/5: Differs from the Autocrat mainly in power unit (Gipsy Major I), and has a long-range tank as standard equipment.

FORTHCOMING EVENTS

Mar. 17th.—Royal Aeronautical Society: "The Design of Propellers", J. Mullin, B.Sc.(Eng.), A.F.R.Ae.S., and C. G. I. Gardiner.
Mar. 18th.—Institute of Navigation: "The Use of Radar Beacons," K. A. B. Gilfillan, M.B.E.
Mar. 22nd.—R.Ae.S. (Belfast): "Civil Aviation—Present and Future," P. G. Masefield, M.A., F.R.Ae.S., G.I.Mech.E.
Mar. 22nd.—Royal Aeronautical Society: Joint Meeting with the Airport Engineering Division of Civil Engineers.
Mar. 23rd.—Royal Aero Club: Annual General Meeting.
Mar. 23rd.—R.Ae.S. (Luton): Members' Discussion Evening.
Mar. 23rd.—R.Ae.S. (Leicester): Films.
Mar. 23rd.—R.Ae.S. (Graduates' and Students' Section): Annual General Meeting.
Mar. 24th.—R.Ae.S. (Isle of Wight): Brains Trust.
Mar. 24th.—The Science Museum: "The Aircraft Collection," G. Tilghman Richards, M.I.Mech.E., F.R.Ae.S.
Mar. 26th.—Edinburgh Flying Club: "At Home," Macmerry, Edinburgh.
Mar. 26th.—Rugby Football, Twickenham. The Army *versus* Royal Air Force.
Mar. 30th.—R.Ae.S. (Weybridge): Junior Prize Lecture.
Mar. 30th.—R.Ae.S. (Gloucester and Cheltenham): "Radar Aids in Aeronautics," Dr. S. F. Evans, M.Sc., Ph.D. At Cheltenham.
Mar. 30th.—Royal Air Force Club: Annual General Meeting.
Mar. 31st.—Royal Aeronautical Society: "Repeated Loading of Aircraft Structures," Dr. P. B. Walker, M.A., F.R.Ae.S.
Mar. 31st.—R.F.C. and R.N.A.S. Reunion, Londonderry House, W.1.
April 2nd.—British Interplanetary Society: "Astronautics and Astronomy," M. W. Ovenden, B.Sc., F.R.A.S.
April 4th.—R.Ae.S. (Derby): "Rocket Propulsion and Inter-planetary Flight," A. V. Cleaver, A.R.Ae.S.
April 5th.—R.Ae.S. (Belfast): Evening of films by William Courtenay, M.M.
April 6th.—R.Ae.S. (Weybridge): "Historical Review of Aircraft Development," Sir Frederick Handley Page, C.B.E., F.R.Ae.S.
April 6th.—R.Ae.S. (Luton): Film Show.
April 6th.—R.Ae.S. (Graduates' and Students' Section): "The Trend of Jet Engine Development," A. A. Lombard, A.F.R.Ae.S.
April 7th.—Royal Aeronautical Society: "Investigation of Aircraft Accidents in Relation to Aircraft Design," A. Cdre. Vernon Brown, C.B., O.B.E., M.A., A.F.R.Ae.S.
April 12th.—R.Ae.S. (Belfast): Annual General Meeting.
April 13th.—R.Ae.S. (Leicester): Annual General Meeting and Members' Papers.
April 13th.—R.Ae.S. (Brough): "Brabazon Aircraft," Mr. Pollicut.
April 15th.—Institute of Navigation: "The Influence of Echo Sounding," A. J. Hughes, O.B.E.
April 18th.—United Services Flying Club: Air Display at Elstree in aid Soldiers, Sailors and Airmen's Families Association.
April 19th.—R.Ae.S. (Graduates' and Students' Section): "The Meaning and Measurement of Stability Derivatives," P Fink, B.E. T.

No. 3 Fighter Squadron

A Bristol monoplane over Stonehenge in 1912. This photograph inspired the unit's first badge.

The Story of Our Oldest "Heavier-than-Air" Unit and its Antecedents

By JOHN YOXALL

The original badge of No. 3 Squadron.

"THERE is another and far more important phase of aerial locomotion which in the near future will have to be reckoned with. In a few years we may expect to see men moving swiftly through the air on simple surfaces, just as a gliding bird moves. Such machines will move very rapidly, probably never less than twenty and up to a hundred miles per hour; nothing but the heaviest storms will stop them. They will be small and difficult to damage, and their range of operations will be very large."

So spoke Colonel J. E. Capper in a lecture on military ballooning to the Royal United Service Institution in 1906. Within a few short years the accuracy of his forecast was proved by the birth of Britain's first "heavier-than-air" unit, subsequently to be known as No. 3 Fighter Squadron and to form the nucleus from which the Royal Air Force was to grow.

As is usual in Britain in such matters, early development was left to private individuals, notably Lt. Dunne (now Colonel Dunne and author of *An Experiment with Time*), who worked on tailless designs, and S. F. Cody, who essayed building what came to be known as the British Army Aeroplane, a magnificent structure of bamboo, fabric and wire. This was in the winter of 1907-8.

These experiments were supported by the Balloon Factory, the forerunner of the R.A.E., and, in February, 1909, on Laffan's Plain, Cody flew his aircraft for a distance of 400 yards at a height of about 12 feet. A speed of some 12 m.p.h. was recorded against a 10 m.p.h. wind.

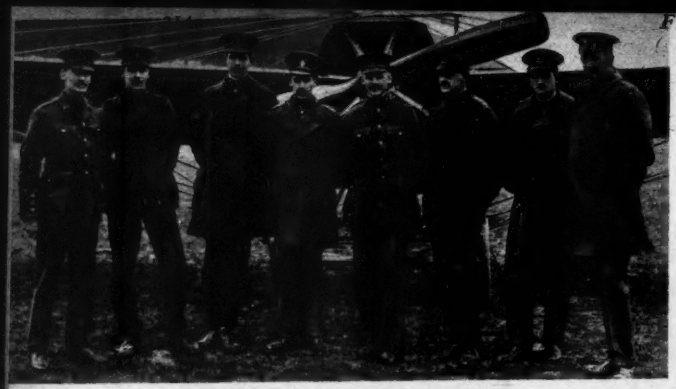
In 1910 the Bristol company came into the picture. They had produced their famous "Box-kite" and established themselves at both Brooklands and Salisbury Plain, in close co-operation with the military authorities. At the end of September it was arranged with the War Office that for the army manœuvres Capt. Dickson and Mr. Robert Loraine should each fly a Bristol, and Lt. L. D. L. Gibbs his own Farman. The experiment was a success, and Major Sir Alexander Bannerman, who commanded the Balloon Section, R.E., was ordered to "enlarge the scope of work hitherto carried out by affording opportunities for aeroplaning."

By January, 1911, the Balloon Factory had four heavier-than-air craft—a Bleriot, a Wright, a Henry Farman and a biplane purchased from Mr. Geoffrey de Havilland (now Sir Geoffrey, head of the famous aircraft concern). Up to then "D.H." had been experimenting at his own expense at Newbury, but, having come to the end of his resources, had sold his aircraft to the Government and joined the Balloon Factory as designer and test pilot. He was also a member of what was then known as the First Reserve of Officers, and later was to be attached for a time to No. 3 Squadron and do some anti-submarine patrols on a 50 h.p. Bleriot monoplane off the Scottish coast early in the 1914-18 war.

In March of the same year the War Office decided to form the Air Battalion of the Royal Engineers to supersede the Balloon School. It was to comprise headquarters and two companies—No. 1 to handle lighter-than-air craft and No. 2 to fly heavier-than-air machines. H.Q. and No. 1 Company were at Farnborough, while No. 2, with their aircraft, were at Larkhill on Salisbury Plain. The officers were to be seconded from other regiments and, among other desirable qualifications, were to be able to read maps, make field sketches, be immune from sea sickness and be bachelors under the age of thirty. The battalion came into being on April 1st; and presumably this is the reason for all subsequent major changes in the R.F.C. and R.A.F. occurring on this peculiar date.

In 1911 there was, of course, no proper schedule of training laid down. Army commanders had to envisage the employment of an entirely new arm, and officers of different regiments were bound to clash occasionally on matters of divided loyalties. Nevertheless, the air picture was now to be seen fairly clearly, though the new arm was, as yet, regarded mainly as a reconnaissance aid for an expeditionary force.

The Air Battalion of the Royal Engineers



August, 1912: (left to right) Capt. Dawes, Lt. Wadham, Capt. Fox, Lt. Lawrence, Major Brooke-Popham, Capt. Conner, Lt. Ashton and Capt. Allen.

Trainer of 1910. The Bristol Box-kite, which was a two-seater powered by a 50 h.p. Gnome rotary engine. It had a front elevator.

No. 3 Fighter Squadron

had a very short existence, and its successor, the Royal Flying Corps, was constituted by Royal Warrant on April 13th, 1912, the Air Battalion being absorbed into it on May 13th.

In the new set-up No. 1 Company (Lighter-than-air) became No. 1 Squadron, but No. 2 Company (Heavier-than-air) became No. 3 Squadron. At the same time, No. 2 Squadron was formed from a nucleus of pilots at Farnborough, under the command of Capt. C. J. Burke.

Air Chief Marshal Sir Robert Brooke-Popham who, with the rank of Major, at that time commanded No. 2 Company, has been kind enough to record some of his recollections for *Flight*: "In about March, 1912," he writes, "I was seconded to the Air Battalion and told to take command of No. 2 (Aeroplane) Company. That was the only unit formation of any sort that possessed aeroplanes. On about May 12th or 15th No. 2 (Aeroplane) Company was given a new name—No. 3 Squadron, Royal Flying Corps (Military Wing)." Sir Robert's recollection is borne out by the official history, which gives the date as May 13th.

Sir Robert's reminiscences of this early period are interesting. He had stated in a lecture in 1910 that he saw no reason why people should not shoot at one another in the air, with light weapons. With this belief in mind, and as soon as he was posted to the Air Battalion, he had the matter put to the test. A rifle was taken in the air; it was fired and, somewhat to the crew's surprise, the aircraft did not disintegrate. Sir Robert then started to experiment with a machine gun in the rear seat of a Bleriot, but was told that he was "upsetting the aerodynamics" and that "all these experiments were to stop." Staff Sgt. Pearce helped a lot in this early work and up to his death in 1948 was the secretary of the R.A.F. Small Arms Association.

Training still consisted mostly of cross-country flights (and frequent forced landings at large mansions with attractive inmates) and trials and experiments to find suitable equipment. Lt. Joubert (now Air Chief Marshal Sir Philip Joubert) specialized in air photography, and an album of his early efforts is a treasured possession of the Squadron.

In the 1912 manœuvres, held in Cambridgeshire, No. 3 Squadron took a prominent part in what was the first really serious attempt at using aircraft with the army. At 10 a.m. on the critical day, Major Brooke-Popham was able to give General Grierson a sketch-map showing the disposition of the enemy columns. As a result, General Haig was so out-manœuvred that the whole scheme broke down long before it was due to finish.

2nd-Lt. Geoffrey de Havilland.

One of the big events of 1913 was the first royal review of the Royal Flying Corps. It was held at Farnborough, and nine aircraft of the squadron took part. The machines landed and the pilots were presented to King George V, after which they took-off again and flew past. At least three members of No. 3 Squadron present at this review were also to be on parade at the first royal review of the Royal Air Force, at Mildenhall, 22 years later.

Another twelve months' training having passed, the authorities became more ambitious in the matter of air exercises. In June, 1914, a Concentration Camp was held at No. 3's home station, Netheravon. It was attended by Nos. 2, 4, 5, 6 Squadrons and detachments of Nos. 1 and 7.

Two months later the storm broke. The squadron orders for August 7th are signed by Major J. M. Salmond (later Marshal of the R.A.F. Sir John Salmond), the officer of the day was Lt. McNeece (who became A.V-M. W. F. McNeece-Foster), and Lt. Joubert's name appears in C Flight's list. With B Flight's road party was Lt. A. S. Barratt (later Air Chief Marshal Sir Arthur Sheridan Barratt) and included in the C Flight road party was Air Mechanic J. B. McCudden—later to become Major McCudden, V.C., D.S.O. with Two Bars. The actual move to France began on August 12th when 12 aircraft—seven Bleriots, four Henry Farmans and one B.E.8—took off for Dover. One of the seven Bleriots crashed and both occupants lost their lives, but the remainder of the machines flew to Amiens the next day—the first squadron to land on the Continent. Another tragedy occurred on the following day, on the way to Maubeuge: the B.E.8 caught fire in the air and Perry and his mechanic were killed.

On August 19th the first reconnaissances of the Royal Flying Corps were made. Capt. Joubert, of No. 3 Squadron, in a Bleriot, and Lt. G. W. Mapplebeck, of No. 4 Squadron, in a B.E., both started off at 9.30 a.m. Joubert was to reconnoitre the Nivelles-Genappe area in order to report the whereabouts of the Belgian forces, and Mapplebeck was to look for cavalry at Gembloux. Both lost their way. Joubert attempted steering by compass through clouds and landed two hours later at Tournai. Taking off at 12.15 p.m. he was soon lost again and at 2 p.m. landed at Courtrai. After ascertaining from a gendarme that the H.Q. of the Belgian Flying Corps was at Louvain he left Courtrai at about 3 p.m. and arrived back at Maubeuge at 5.30 p.m.

This period of the Squadron's history is vividly recalled in the war diary of Lt. W. R. Read, of B Flight. An entry for August 17th 1914, tells how pilots had to stand by for a Zeppelin. "We were armed," he says, "with three bombs and a revolver each." The bombs, of course, were to drop on the airship, if any of the pilots could persuade their machines to climb high enough, and the revolvers were for air fighting.

Peacetime habits die hard. Despite the serious position in which the Allies found themselves at the time of the Mons retreat, Lt. Read goes to some length to describe how the officers went out shooting game each evening. His entry on the day on which he got a new aircraft marks him to be one of the true pilot breed. "This new Henry [Farman] climbs rippingly and gets up to 5,000ft in just under 30 min." What would he have thought of the Squadron's present Vampire FB.9 which from a standing start reach the same height in roughly two minutes?

During the retreat from Mons, No. 3 put in some very stout work, and it is conceivable that, had the Squadron been trained for offensive purposes only, and not also for reconnaissance, the disaster to the British Army might have been much worse than it was. That this was so is emphasized by the following extract from the entry for September 9th, 1914, from Gen. Sir Horace Smith-Dorrien's book *Memories of Forty-eight Years' Service*:—

"Our aeroplane officers are real heroes . . . in spite of being shot at almost every time they go up, they continue

Types of No. 3 Squadron aircraft in 1913 (left to right): B.E.8., nicknamed "Bloater"; Henry Farman; and Bleriot monoplane.

their reconnaissances and bring back quite invaluable, and what always proves to be true, information. Just now, two of them arrived one after the other; both their machines had been hit several times, and one of the officers had a bullet actually through his clothes, which he produced whilst he was talking to me. The Flight attached to me consists of Major Salmond, Captains Jackson, Charlton, Conran and Cruikshank—Jackson was the man who produced the bullet."

During the Battle of the Aisne a clearer picture of the use of air power began to appear. Aircraft were allotted to definite divisions; they would take-off, land behind Divisional H.Q. to receive their orders, and then carry on with operations. Some would be detailed for reconnaissance, some for artillery observation and others for offensive patrols. A splendid idea of early air fighting is conveyed by a passage in the Squadron's chronicles; the pilot is referred to as C—— (probably Capt. Charlton, D.S.O., or Lt. E. L. Conran):—

"We went up to observe artillery fire for the 108th battery. While we were doing it, a German machine came in sight so we left off observing and made for the Taube. He was about 200 feet higher than we were, we being at 4,700 feet, but it is not at all a bad position—in a Henry—to be below your adversary. I tried to climb up nearer to him and in the meantime E—— [the observer] was shooting at him with the rifle. The German turned twice, trying to get me immediately below him so as to drop a bomb, but I kept clear knowing what he was trying to do. I continued to keep him on my left front and above me, but he could climb quicker than Henry. But I was a little faster and was gaining on him. In the end, after having some shots at us he made off to his own lines while we gave chase until we came within range of 'Archibald' and then we left him. Having got rid of the Taube we returned and went on with our observations of fire." ["Archibald" was R.F.C. slang for ack-ack.]

We have, to-day got so accustomed to seeing 2,000-yd concrete runways and hard standings that it is difficult to appreciate what constituted a Service airfield in 1914. For instance, when, in November, No. 3 were ordered to leave Gonnehan, the ground was so soft that take-off was impossible. Without more ado the Squadron personnel were marched up and down wind until a path was sufficiently consolidated for use as a runway.

Although No. 3 Squadron, and Lt. Joubert in particular, had early shown the possibilities of air photography, no specialized cameras were available when war came. The importance of this branch was, however, brought to a head early in 1915 by Lt. C. C. Darley, of No. 3. This officer made a map from pictures taken with his own camera (cameras, by the way, were forbidden) and this map was shown to Corps H.Q. by the Squadron C.O. So impressed were the soldiers that the incident led to a special camera being designed for air work. Meanwhile, with the poor apparatus at their command, the Squadron, in company with No. 2, photographed the complete 1st Army front in preparation for the Battle of Neuve Chapelle.

No. 3's major job was, of course, reconnaissance, but a number of bombing raids were made. On one occasion they went 36 miles from St. Omer to Gervules to bomb the Kaiser, who was reported to be there. Another sortie, surely a forerunner of the specialized attacks on individual buildings in the recent war, was a raid on German Divisional H.Q. in Fournes. Three aircraft made the attack: Capt. E. L. Conran led (with Major Salmond as observer) and Lts. Birch and Hanlon flew the other two machines. The pilots attacked at three-minute intervals and got direct hits, setting fire to the objective. Conran and Salmond three times came to within 300ft of their target before *dropping their bombs over the side.*

Artillery observation was another of the unit's important duties, and in the very early records the name of Lt. A. S. Barratt appears as one of the principal exponents of this art. He used to fly Bleriot No. 616 and had McCudden as his mechanic.

Interdiction, then known less succinctly as bombing the enemy's lines of communication, was also on the list of squadron duties. In fact, the first D.S.O. gained for No. 3 was awarded to Capt. Pretyman, on March 13th, 1915, for "hampering the enemy's railway communications at Don." The centre coaches of a supply train were blown up as it entered the station.

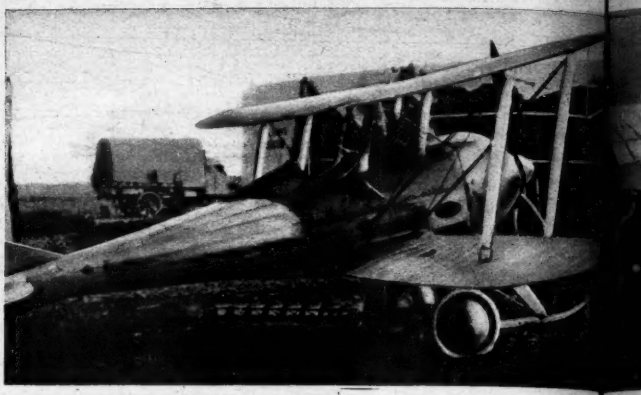
A rarer but no less important form of operation which started in the autumn of 1915 was the landing of secret agents behind the enemy lines. The first attempt appears to have been unsuccessful, but, on September 28th, Capt. G. L. Cruikshank, of No. 3, flying a Morane Parasol, completed his mission. It must be remembered, of course, that no parachutes were then in use; an order to land an agent behind the lines meant literally what it said.

Early in 1916 the Germans began to operate fighter formations of Fokkers, and by the time the Battle of the Somme opened on July 1st, 1916, air fighting on the grand scale had begun. Odds similar to those of the Battle of Britain were customary. On July 21st, for instance, an aircraft of No. 3, joined by three from No. 24 and two from No. 22, fought 15 Germans over Bapaume for 30 minutes. One enemy aircraft crashed at Warlencourt, another at Combles, a third at Baulecourt, and two others force-landed. The six British had no casualties.

Lt. Shekleton of B Flight (Henry Farman) flies past on the King's Birthday celebration parade held on Salisbury Plain in 1913.

Lt. Wadham, A Flight, landing over the tape during the 1914 Concentration Camp. This actual Bleriot went to the war.

George Pretyman (pilot) and "Hoppy" Cleaver trying the first stripped Lewis gun in a Morane Parasol.



Lt. Shekleton's S.E.2a at Clioques in December, 1914. Note the armament—one .45 Service revolver.

A remarkable incident occurred on July 26th, when 2nd Lt. L. G. Wood and his observer H. J. L. Cappel, had been sent out to see how the infantry were faring in an attack on an important strong-point. The officers made an "area call" to the artillery to open fire. Shells fell accurately and a British tank and its bombing party were able to get as far as the sector which was being bombarded. A second call was made to the artillery to cease fire. As the shelling ceased, the pilot dropped to 300 feet and flew along the trench, raking it with machine-gun fire. The endurance of the occupants snapped and they waved arms and white handkerchiefs in surrender to the airmen. The news was communicated by message bag to the infantry, who advanced and accepted the surrender of eight officers and 362 men.

With the advent of specialized fighter units, No. 3 became one of a number of squadrons to be detailed for such duty and, until the armistice of November, 1918, it spent its time in air fighting, low bombing and making machine-gun attacks against ground targets. During the period in which the Squadron had Sopwith Camels—October, 1917, to November, 1918—it accounted for 59 enemy aircraft.

The Great War ended No. 3 remained in France until February, 1919, when it was reduced to cadre strength and returned home to be disbanded.

For the next few years the unit had a very chequered career. In 1920 it was re-formed in India, at Ambala, but was disbanded again and re-formed at Leuchars, in Scotland, in 1921, as a general reconnaissance unit. After a year in this role it was disbanded yet once more, this time at Gosport.

On April 1st, 1924, equipped with Sopwith Snipes, it was revived once again, at Manston, under the command of S/L. J. C. Russell, D.S.O., and started to practice night-fighting. After a while the faithful Snipes were discarded and were replaced by Hawker Woodcocks. Thus No. 3 became at that time the only specialized night-fighter squadron in the Royal Air Force.

In the spring of 1926, S/L. Russell handed over the reins to S/L. J. M. Robb (now Air Chief Marshal Sir James Robb, K.B.E., C.B., D.S.O., D.F.C., A.F.C., C.-in-C. Air Forces Western Europe). Sir James recalls for the writer how, within a month or two of taking over the Squadron, he found it detailed to do special illuminated night flights at the Birmingham and Aldershot tattoos. The Woodcocks each had about 80 lights under the lower planes.

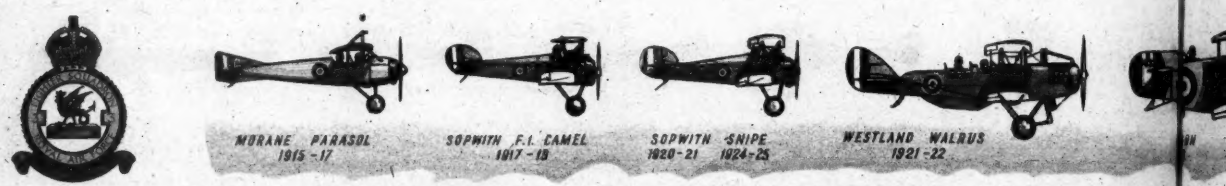
Another of Sir James's recollections is of the small circle of the defence of London, which, in the air exercises of 22 years ago, it was his duty to keep clear of the "enemy." The "enemy" was S/L. Harris, who led No. 58 Bomber Squadron in their Vickers Virginias. S/L. Harris, in the recent war, came to be Marshal of the Royal Air Force Sir Arthur Harris, G.C.B., O.B.E., A.F.C., the renowned A.O.C.-in-C. of Bomber Command during its greatest period. An interesting sidelight on the middle 'twenties is Sir James Robb's recollection that he once gave permission to one F/O. P. Cranswick, M.C., to take his Woodcock and land at *every* R.A.F. airfield, *all in one day*.

With the exception of aircraft changes—Gloster Gamecock in August, 1928, and Bristol Bulldog in 1929—the Squadron had a more or less uneventful peacetime life at Upavon and Kenley.

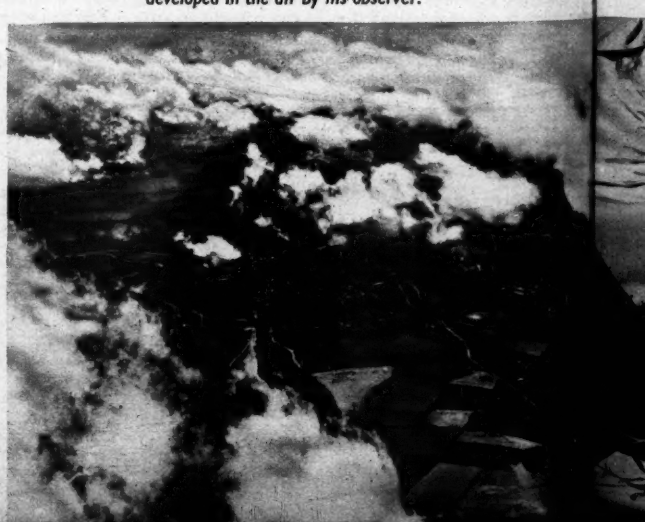
In 1935, however, King George V held his first royal review of the Royal Air Force, at Mildenhall. More than 350 aircraft took part and, by virtue of seniority, No. 3 Squadron on their Bulldogs had the honour of leading the Fighter Group of eleven squadrons.

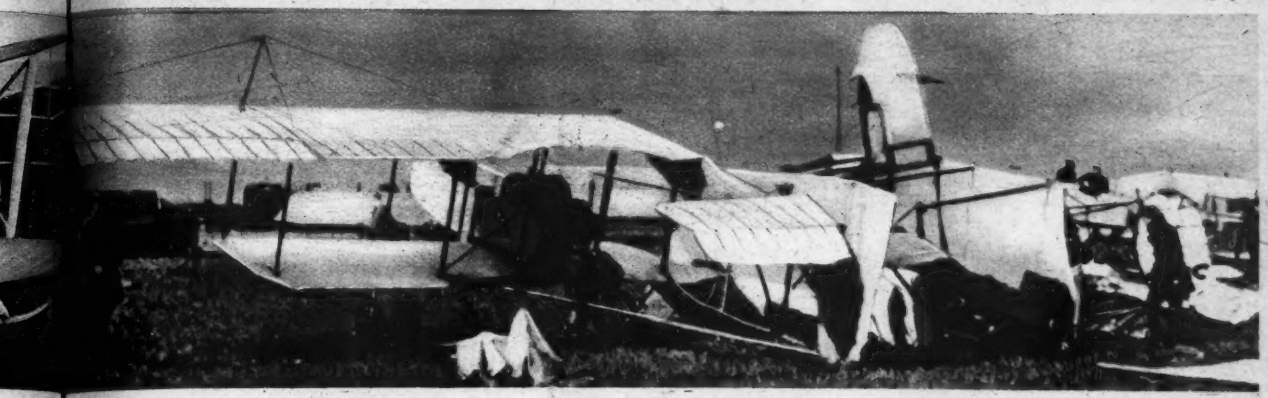
The King spent some time with the Squadron on the ground and chatted with G/C. Strugnell, M.C., and W/O. Eley, both of whom were original members of No. 3 in 1912, G/C. Strugnell as an Air Mechanic and W/O. Eley as a boy. In command of R.A.F. at the review was Air Chief Marshal Sir Robert Brooke-Popham, the first C.O. of the Squadron, who was then A.O.C.-in-C. Air Defence of Great Britain. His Majesty also spoke to a F/O. Donaldson, of No. 3, who had won the Brooke-Popham air firing trophy for two years in succession. It was the same Donaldson, now a Group Captain, who broke the world's speed record by clocking 616 m.p.h. on a Gloster Meteor in 1946.

Four more years of peace-time training followed, and by the time that the second German war broke out in 1939 the unit had been re-equipped with Hawker Hurricane Is and was stationed at Biggin Hill. During what was known as the "phoney war" its duties consisted almost entirely of shipping and escort patrols and practice night flying.



Photograph of Salisbury in 1913, taken from Lt. Joubert's Bleriot and developed in the air by his observer.





The havoc among the squadron's aircraft caused by a gale at Fere-en-Tardenois on December 28th, 1914. Damage was so severe that no operational flights could be made for a number of days.

On May 10th, however, when the war started in earnest, the Squadron left in that grey afternoon for Merville under the command of S/L. Patrick Gifford, D.F.C. (he was later killed in France). The ground crews and equipment were flown over the next day in Ensigns, Harrows and Bombays.

The first action occurred shortly after the unit's arrival, and with it came the Squadron's first successes. A formation was patrolling between Tourcoing and Ghent at about 1930 hours when bunches of Heinkels were sighted, flying at 7,000 feet in formations of five or seven each, circling and bombing 10-15 miles north-east of Lille, and being fired at by our ack-ack. The Hurricanes, their R/T unserviceable, gave chase. There followed numerous dogfights in which No. 3 shot down some five Heinkel 111s, and, as far as can be ascertained, the distinction of bagging the Squadron's first enemy aircraft fell

to P/O. F. R. Carey, D.F.M., who four days later failed to return from a patrol south of Louvain. Eventually he found himself in a Belgian hospital, and later returned to England.

Carey, who is now Wing Commander Flying at Gutersloh, in Germany, recalls the action in these words: "A few hours after the Squadron's arrival at Merville, I decided to have a look round the local area. Three of us took off in formation and headed east, where I spotted a lot of unescorted Heinkels circling and bombing Courtrai. This was the first time I had seen more than one enemy aircraft and in my initial excitement attacked first one and then another without much result. I eventually decided to settle on one, which crash-landed in a cloud of dust. I continued attacking the others until my ammunition was expended and returned independently to refuel and re-arm."

The Squadron operated from Merville for ten days. Though for two of those days the Squadron did not fire their guns, a total of 178,000 rounds of ammunition were fired and sixty enemy machines destroyed, plus ten possibles. The destroyed included 17 Heinkel 111s, 16 Junkers 87s and seven Dornier 215s. The Squadron's total loss was 21 machines, which included two aircraft that collided, and one that crashed on a delivery flight. For reinforcements No. 3 Squadron was fed by pilots from Nos. 56, 32 and 253 Squadrons.

When France collapsed, the order came to evacuate Merville, and by devious routes and a variety of vehicles the unit—or what was left of it—arrived at Boulogne and embarked in the *Manx Queen* for England. The fighting had been very severe and the Squadron was without either adjutant or intelligence officer—the duties of which posts were, however, being efficiently performed by A/C1 J. J. Hackett, of the orderly room.

After such a spell of duty it was obvious that the Squadron was due for a rest, and for this purpose it was posted to the north of Scotland. Although the rest was well deserved, everyone was depressed at the idea of being out of the Battle of Britain. Life was not entirely without its excitements. There was a scramble one day to intercept a raid on the Fleet in Scapa Flow and in the ensuing interception P/O. D. A. L. Jones shot down a Heinkel. Despite the intensity of the Battle of Britain, No. 3 was kept in Scotland, getting the odd Hun every now and then, with an occasional crack at big prey such as the long-range F.W.200 Condors. But all things come to an end and at last, in March, 1941, the Squadron came down to Martlesham Heath and took over the Hurricane IIs of No. 17 Squadron. Duties were mostly convoy patrols, but the operations known as "Fighter Nights" were also started. The first Fighter Night successes came on the night of May 10th-11th—the great raid in which the area bordering on St. Paul's Cathedral in London was burnt out.

In June a move was made from Martlesham to Stapleford Tawney and intruder sorties over France were added to the duties of Fighter Nights, convoy and bomber escorts. It was while on a bomber escort from this station that pilots of the Squadron had what is thought to have been the first sight of a pilot-ejector seat in action. The six Hurricanes

The Morane Parasols of No. 3 Squadron at La Houssoye in 1916. The pilots on the right include Roberts, "Splinter" Wood, Pither, Houghton and Lewis. Ranks and initials are not available.

Royal Review, 1935 : (left to right) The C.O. S/L. G. Martyn, King George V shaking hands with F/O. Donaldson, Air Chief Marshal Sir Robert Brooke-Popham, G/C. Strugnell and W/O. Eley. (Centre) A squadron formation of Bristol Bulldogs over Port Sudan later in 1935.

of No. 3 were high cover to three Blenheims, and when Sgt. Shaw destroyed an attacking Me 109F, the German pilot made his escape by being ejected. When he landed Sgt. Shaw said:—

"I was flying Red 2, with F/L. Berry as Red 1. As we went in to engage two Me 109s we were seen when we were about 2,000 yards away and slightly to port. They climbed very fast, and I climbed to attack. Two more Me 109s were farther down and Red 1 went to attack one of them. The other dived on to Red 1's starboard quarter, and I called out 'Caddy Red 1; 109 at six o'clock above.' I could see his tracer flying past Red 1. I made a quarter attack from below, allowing a ring-and-a-half deflection, for a seven seconds burst. When my de Wilde struck his engine cowling the pilot shot out of his cockpit like a jack-in-the box, and his parachute opened before he was clear. I saw his plane hit the water."

Every type of patrol and raid was now being flown and much practice put in at "Turbinlite." In this operation a Havoc, with a searchlight in the nose, stalked the enemy in company with a Hurricane. On contact the Havoc illuminated the target while the Hurricane did the shooting. Though that was the theory it has been said that Turbinlite caused more work for less effect than did any other wartime brain-wave.

The winter of 1942-43 was spent with the Squadron split in halves. A Flight was at Hunsden on defensive night-fighter work and B Flight at Manston for work over the Channel and Continent.

Even Hurricanes at last became out-dated, and in February, 1943, the Squadron re-united at Hunsden to be equipped with Typhoon 1Bs.

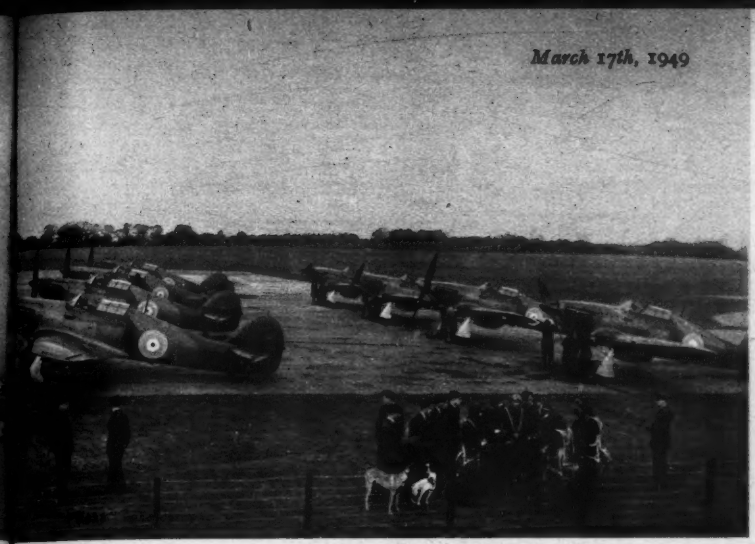
After years of Hurricane flying, the Tiffy seemed very formidable and there was the usual whispering campaign against it. Its popularity was not enhanced when a pilot of the Squadron, making the first flight on the new type, had his flaps snap up just as he was about to touch down and finished up in a cloud of dust off the end of the runway. All trace of inferiority complex disappeared when the next Tiffy was delivered—by an A.T.A. girl ferry pilot.

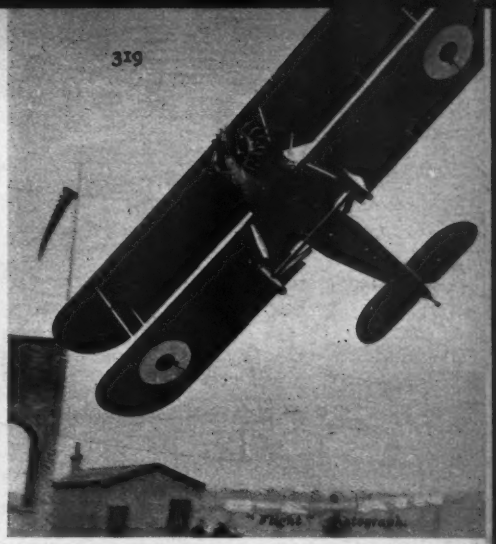
With its new aircraft No. 3 moved to West Malling in company with No. 8 Squadron (Mosquito night-fighters—then commanded by W/C. John Cunningham, renowned as a night-fighter specialist and now chief test pilot of de Havillands). The first operation with the new "Bomphoons" took place two days after the move. Eight aircraft made a raid on the marshalling yards at Eu. All returned from this raid, but a deeper penetration—to the airfield at Poix, two days later—ended in tragedy. Over the target there was intense flak and one Typhoon was shot down. While the remainder were reforming they were jumped by some F.W. 190s and a further four lost. There seems to have been some trouble over the cover.

That such hard knocks were taken without harm to morale is evidenced by F/O. Dudley Knight's account of a party and a move on June 11th, 1943: "The Squadron moved from West Malling to Manston. Many were startled at having to move again so soon, particularly as everyone had made himself so comfortable at Malling. . . . It was therefore rather fortunate that the date should coincide with the 'Biggin Hill Party' at Grosvenor House, in celebration of the Sector's 1,000th Hun. The Squadron Officers and Sergeants were among those invited, and it was a great opportunity for revival of spirits for the depressed. One and all had the granddaddy of all parties.

"It has never yet been definitely confirmed whether the Adjutant was suffering from the effects of the party or just normal generosity, but for the move he placed an exceptionally fine order with the local railway agents, who turned out one of their best lines in trains, complete with two engines, and enough rolling stock to move a regiment. Unfortunately the Squadron could muster only sufficient personnel to fill one or two coaches, so the whole thing had to be whittled down, much to the annoyance of the R.T.O. This gentleman was later placated by a diplomatic letter from the Adjutant, assuring him that the officers responsible had been sharply admonished and all honour was satisfied. Never one to be abashed by a trifling error, F/O. Custance henceforward referred to

Interdiction : The result of a low-level attack on an ammunition train North of Perleberg, by S/L. Cole, D.F.C., on April 24th, 1945.



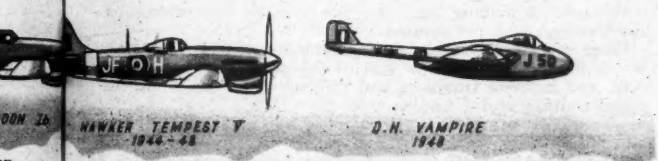


May, 1938: The squadron's Hurricane Is on the airfield at Kenley. In the foreground the pilots receive a final briefing. (Right) The Hawker Woodcock of 1926. It was powered by a 450 h.p. Bristol Jupiter engine. No. 3 was the only squadron to have these aircraft.

himself as 'the twin-engined Adjutant' and wore the two top buttons of his tunic undone."

From then onwards the squadron was called upon to do a number of moonlight low-bombing operations and shipping strikes as far north as the Dutch islands. In one of these strikes the formation was jumped by some Me 109s and three were lost. Sgt. Lawrence baled out and, rumour has it, was next heard of as P/O. Lawrence in an Oflag; he had a reputation for being fond of comfort.

Shortly after S/L. Hawkins had taken over command, in September, 1943, another trip to the Dutch island provided plenty of excitement; it also proved the inherent quality of R.A.F. aircrews. The following account is taken from the Squadron's records: "It was a costly trip, as we lost F/Sgt.



HAWKER TEMPEST V 1944-45 D.H. VAMPIRE 1948

Ray Crisford—who headed inland and force-landed in Belgium—and also a promising newcomer to the Squadron, the Canadian F/O. Johnny Downs. Johnny baled out near a fishing fleet and must have been picked up, for we learned later that both were P.O.W. Before hitting the silk, Johnny made a short speech of farewell and good wishes to the Squadron, we must thank him for this when we see him again.

"At mid-day, F/Lt. Collins, D.F.C., and Sgt. 'Lefty' Whitman flew out to search for F/O. Downs. When they were about fifteen miles from the Dutch coast, Whitman's engine cut while he was at zero feet. He pulled up to 500ft, opened the hood, released his straps and, sliding off his helmet and oxygen mask, climbed on to the starboard mainplane, still holding the stick and levelling off for a landing on the sea. When he hit at 110 m.p.h. he was thrown like a skipping stone along the water, and cut his eyelid on some part of the aircraft as he left it. F/Lt. Collins saw him get into his dinghy, and climbed to give a fix for the A.S.R.

"For the rest of the day the Spits and Typhoons took turns at mounting guard over 'Lefty,' and it was just at dusk that he was finally located by the Walrus and carried back to Hawkinge . . . 'Lefty' was only the second pilot ever to to 'ditch' a Typhoon and get away with it."

S/L. Hawkins was killed a short while later while leading No. 3 in a bomb attack on an oil refinery near Ghent. Command of the unit was then taken over by S/L. Dredge, D.F.C., who came from No. 183 Squadron. He was a very experienced fighter pilot, having fought in the Battle of Britain and in the defence of Malta. Under his command the losses were cut considerably and he appears to have initiated what became an almost standard method of bombing attack by Typhoon. The aircraft was put into a very steep dive at 12,000ft and the bombs released at about 7,000ft.

On November 10th, 1943, the first No Ball (code-name for attack on flying-bomb installations) was flown. This work became intensified as time went on, relieved occasionally by duties as fighter escort to medium bombers attacking the same targets and V.2 rocket sites.

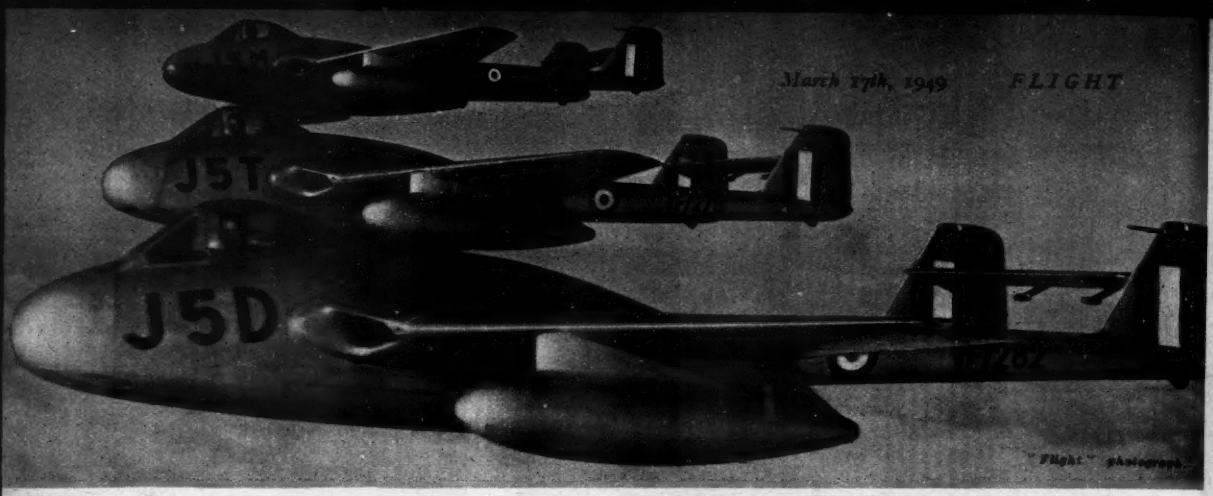
In the last week of 1943 a move was made from Manston to Swanton Morley, in Norfolk. The personnel, it seems, took a rather dim view of a change which moved them from their beloved Manston with all its comings and goings and air of informality. At Swanton Morley long-range tanks were fitted to the Tiffies and after a while sorties of 560 miles could be flown for the purpose of escorting Beaufighters on shipping strikes; but these long-range flights were not altogether successful.

The stay at Swanton Morley was short and by the middle of February, 1944, the unit was back at Manston and, a fortnight later, started re-equipping with Tempest Vs. To practise night landings and formations in preparation for D day, a further move was made to Bradwell Bay and yet another to Newchurch on the Romney Marshes—this time under canvas. On the night of June 4th, squadron letters were all changed and the famous black and white striped invasion markings were painted on all aircraft.

In the event, however, the Tempest squadrons were not used as much as they had expected to be. When the flying bombs started to come over, on June 14th, the reason became obvious. The first bomb to be shot down fell to the guns of F/Sgt. Morris Rose at 07.50 hrs on June 17th, south of Maidstone. Altogether, No. 3 shot down no fewer than 288 of these abominations and at the most intensive period got 100 of them in 13 days. Three pilots were lost.

At the end of September the Squadron found itself back on the Continent for the third time in 20 years. This time its headquarters were at Brussels, but almost immediately a move was made to Volkel in Holland, where it stayed for the next seven months. There it suffered the attentions of the Me 262 jets and P/O. Cole was the first to shoot one down. Like all the other air units in Holland and Belgium in 1944-45, No. 3 put in a tremendous effort at interdiction. Losses were high

Hopsteine—Rheine, 1945: Left to right (standing), Ray Hassall, Pierre Closterman, "Johnny" Walker, Pete West, S/L Cole, "Mac" Macintyre. (Sitting) Gordon Duff, Douglas Worley, "Lefty" Wright and Roy Torpy.



In echelon to starboard, stepped up. A flight of No. 3 Squadron Vampires led by S/L. Macfie in J.5D.

but, fortunately, many of those who failed to return were later found in P.O.W. camps.

In February, 1945, there was another change of C.O. when S/L. R. B. Cole, D.F.C. and Bar, took over from S/L. K. F. Theile, D.S.O., D.F.C. and Bar. In late March, with the crossing of the Rhine, the end of the war came in sight. No. 3 Squadron was part of No. 122 Wing, which was covering the crossing, and supplied the first patrol 30 minutes before dawn at 05.15 hrs. It was composed of eight aircraft led by the C.O. During the whole of the day, however, no German aircraft put in an appearance and the Squadron's total score for the 24 hours was four motor transports damaged.

But life was not easy. On most of the ensuing days when flying was possible as many as four shows a day were flown; transport, A.A. posts, locos. and trucks were the targets.

A short rest in England and April 17th found the Squadron back on operations in the Hamburg area. On its second day back two F.W.190s were shot down, 13 motor transports were destroyed and a further 15 damaged. The score for the day was further increased by the destruction of two tanks, with another damaged, besides three trucks destroyed and another 15, with two locomotives, damaged.

As the end of the war approached so, of course, the number of air combats decreased. On the other hand the number of enemy aircraft destroyed on the ground increased. On May 4th, the last operational flights were made before V.E. day on the 8th. F/L. Closterman led the first sortie at 06.40 hr to the Kiel area on a shipping reconnaissance; guns were not fired. The second, led by F/L. Hughes, took off at 10.25 hr for the Danish border, where road transport was strafed. At 14.30 Closterman again led eight aircraft to the Danish border, this time with some success. Near Schleswig-Holstein some seaplanes were found. The score for the final day's fighting was ten enemy aircraft destroyed and five damaged.

After a suitable period of celebration the unit gradually settled down once more to a more or less peacetime existence and a very significant entry concerning "that wizard band of hard workers, the erks," appears in the Squadron records: "Many old and respected faces have passed through the various demob centres and the new faces which have appeared have lived up to the grand tradition and record of No. 3 Squadron ground crews."

Peacetime duties have included a number of periods in Berlin and occasional trips back to England for such things as Battle of Britain formations and demonstrations on the Westdown ranges. On May 19th, 1947, the present C.O., S/L. Macfie, D.F.C., came from No. 1 Squadron to take over, and in April, 1948, the Squadron started to re-equip with Vampire Is, which they still have.

All the pilots are loud in their praises of the Vampires and, with external tanks fitted, a good duration is available. One peculiar and spectacular accident occurred. P. I. Meechan was a trifle previous during a take-off and selected his "undercarriage up" too soon. The result was that he sat down on his external tanks and skidded for over a thousand yards with both tanks as flaming torches. The Vampire was written-off but Meechan was not injured.

From the accompanying photographs it will be evident that No. 3 Fighter Squadron is still of the same high quality as ever, and in these troublous and difficult times carries on the proud traditions of a famous unit.

W/C. F. R. Carey D.F.C. and Two Bars, A.F.C., D.F.M., Wing Commander Flying at Gutersloh.

COMMANDING OFFICERS (*in chronological order*)

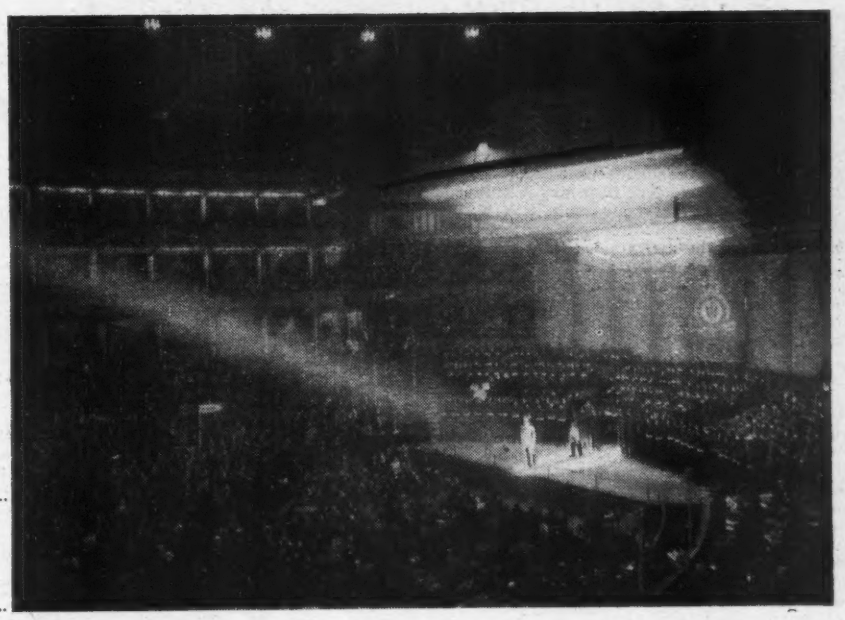
Major H. R. M. Brooke-Popham.
Major J. M. Salmond.
Major D. S. Lewis.
Major E. R. Ludlow-Hewitt.
Major H. D. Harvey-Kelly.
Major D. E. Stodart.
Major E. D. Horsfall.
Major J. A. G. de Courcy.
Major R. Raymond Baker.
Major R. St. Clair McClintock.
S/L. G. G. A. Williams.
S/L. D. G. Donald.
S/L. C. C. Miles.
S/L. J. C. Russell.
S/L. J. H. Robb.
S/L. E. D. Johnson.
S/L. C. A. Stevens.
S/L. G. Martyn.
S/L. H. L. P. Lester.
S/L. H. H. Chapman.
S/L. P. Gifford, D.F.C.
S/L. W. M. Churchill, D.S.O., D.F.C. and Bar.
S/L. S. F. Godden.
S/L. G. F. Chaser, D.F.C.
S/L. A. W. Cole.
S/L. E. P. P. Gibbs.
S/L. R. F. Aitken.
S/L. A. E. Berry, D.F.C.
S/L. L. F. de Soomer.
S/L. S. R. Thomas.
S/L. R. Hawkins, M.C., D.F.C.
S/L. A. C. Dredge, D.F.C.
S/L. K. A. Wigglesworth, D.F.C.
S/L. H. Sweetman, D.F.C.
S/L. K. F. Theile, D.S.O., D.F.C. and Bar.
S/L. R. B. Cole, D.F.C. and Bar.
S/L. F. L. Latham.
S/L. C. H. Macfie, D.F.C.

A recent photograph of the Squadron. Pilots, left to right, are: F/O. Pannifer, P.II W. Hart, P.II E. C. Wheatley, S/L. C. H. Macfie, D.F.C., P.III M. Milton, P.III L. Zappe, P.II J. Collinson and F/O. E. C. Rigg.

The present C.O., S/L. Macfie, D.F.C., being led into captivity after being shot down while escorting Short Stirlings on a daylight raid in 1941. At the time he was serving in No. 616 Squadron.

Bomber Command Reunion

Seven Thousand Recapture the Wartime Spirit: A Message from Their Old Chief Abroad



The impressive scene as Marshal of the Royal Air Force Lord Tedder addressed the vast gathering.

THE Royal Albert Hall, London, was packed to capacity on the evening of March 12th, the occasion of the first Bomber Command Reunion. Men and women, some still in the Service but the majority demobilized, came from all parts of the country with the purpose in view of meeting old friends and recapturing for a few hours the wartime spirit which all remember so well.

In general, the Reunion must be judged a success, and the organizers and those who supported them are to be congratulated on a well-planned function. Everyone goes to such a Reunion with such high hopes that for some there is bound to be a slight let-down. However, once the organized part of the programme was over, tremendous activity ensued as everyone endeavoured, by reference to the Group signposts, to find members of their squadrons. Apparently many succeeded, for in no time the well-known individual squadron calls were set up . . . "Not 95, not 96, not 97, not 98, but NINETY-NINE!"

An overture played by the organ opened the evening, to be followed at 7.15 p.m. with Part I of the stage show, which included the Squadronnaires, led by Jimmy Miller. At 8 o'clock the programme was interrupted while the B.B.C. treated their listeners to 30 minutes of what they, or somebody else, thought a Bomber Command Reunion ought to sound like. As a prelude, Air Marshal Sir A. B. Ellwood gave R/T orders for a Lincoln to take off from Wyton for a flight over London, and the captain of the aircraft later passed a message of greeting to the Reunion while flying overhead at 8,000ft. The W.A.A.F. controllers at Wyton, and the pilot, were heard clearly over the loudspeaker system.

Entertainment

During the broadcast the Master of Ceremonies was John Mills. Stanley Holloway led some community singing, but apparently most of the squadrons had been stood down, except for Operation "Bless 'Em All"; seldom have 7,000 bomber boys and girls made less noise. Anne Shelton returned to sing some popular songs, and Anne Ziegler and Webster Booth entertained. "Two-Ton" Tessie O'Shea enjoyed the best reception of the evening's entertainment before the Central Band of the R.A.F. and an R.A.F. chorus concluded Part II and the interlude "on the air."

Air Marshal Sir Robert Saundby opened Part III of the programme by introducing the Chief of Air Staff, Marshal of the Royal Air Force Lord Tedder. While he did this the shouts from all sides of "We Want Butch" reached a crescendo, and, in answer to an unrehearsed call from the "gods" Air Marshal Saundby joined in three cheers for Air Marshal Harris. Sir Robert read a cable from South Africa in which the ex-C.-in-C., signing himself "Bert," said:—

> "The the men and women of Bomber Command, 1941-45—My regards to the chairborne bombers whose work made the bomber offensive possible. My greetings to the ground staffs who kept 'em flying regardless of the miseries of wet and winter. My salaams to the instructors who kept their necks stuck out to lessen odds on other necks.
>
> "But, above all, my admiration to these too few survivors of our devoted air crews who knocked the enemy flat on land and sea, and out of the air—and whose sons, if need be, will knock him yet flatter, after the long-haired gentry get through picking him up, dusting him off and kissing him better—yet once again. Happy landings, even if the wheels are up."

Lord Tedder was greeted enthusiastically, and during a brief speech gave back as much as he received in the way of good-natured heckling. He said that Britain's defence needed a "strong left" and that strong left was Bomber Command. He also repeated some of his remarks made the previous evening at the Pathfinder Association Dinner regarding the need for good men to go back into the Air Force, though unavoidable disappointment might greet older applicants.

The organizing committee for the Reunion consisted of the following members:—

Joint presidents: Air Marshal Sir Robert Saundby and A.V-M. D. C. T. Bennett *chairman:* Dr. J. C. MacGown; *vice-chairman:* Guy Schofield (Editor, *The Evening News*); *members:* A.V-M. J. D. Breakey (H.Q. Bomber Command); A.Cdre. A. S. Ellerton (Air Ministry); G/C. D. F. E. C. Dean (Pathfinder Association); S/L. A. J. O. Warner (R.A.F.A.); L. M. MacBride (Air Ministry); Cyril Birks (*The Evening News*); W. H. Parsons (Air Ministry); W. B. Harbud (*The Evening News*); *hon. secretary:* G. A. Thorne (Pathfinder Association); *hon. treasurer:* G. R. Boak (R.A.F.A.).

ENGINE APPRENTICES REWARDED

GOOD work during 1948 brought its reward to 24 of the 446 apprentices of the Bristol Aeroplane Company's engine division when, on March 9th, prizes were presented by Mr. N Rowbotham, divisional managing director.

Briefly reviewing the year's work, Mr. H. Teasdale, the principal, said that apprentices had won 48 National Certificates, five Higher National Certificates, and 16 Intermediate City and Guilds Certificates in machine-shop engineering (two with first-class passes). He singled out for special mention apprentice Donald S. Dugdale, who gained a first-class pass in the Final City and Guilds examination in machine-shop engineering and won the second prize of £3 awarded by the Institute.

Civil Aviation Costs

Some Sombre Revelations from the Civil Appropriation Accounts

IN his report on National Expenditure for the year 1947-48, published last week, the Comptroller and Auditor-General comments upon the Exchequer grants to the Ministry of Civil Aviation.

Before the beginning of 1947-48, says the report, the three Airways Corporations submitted programmes of services and certain related financial estimates, those for B.O.A.C. and B.E.A.C. showing deficits which combined were much in excess of the statutory maximum grant of £10,000,000.

Grants to the Corporations did not reflect the full cost to the Exchequer of the air services they operated. Receipts from landing fees represented about one-sixth of the expenditure incurred by the Ministry in providing the airfields and providing the necessary technical services, but excluding any interest on capital. The income fell far short of the cost and it was clear, says the report, that a substantial subvention to air service operators, both British and foreign, was involved.

In the year under review expenditure on landing fields at home and abroad amounted to 1.56 of the Corporation's total operating expenditure. In January, 1948, the Treasury agreed that the provision of ground facilities was not the proper responsibility of operators and authorized the Ministry to meet the expense of facilities essential to the reasonable development of the Corporations' programmes when they were not provided by the local governments. This particularly applied to flying-boat routes. For such purposes some £750,000 was paid to the three Airways Corporations and a related company and the Ministry also issued some equipment free of charge. The Auditor has asked the Ministry for information about their arrangements for controlling the expenditure and the basis of contributions from users.

In 1943 B.O.A.C. formed a development unit for testing aircraft and equipment under civil operating conditions in collaboration with interested Government departments. Expenditure to March 31st, 1946, was allowed under the arrangements for deficiency grants, but in March, 1948, the Treasury expressed the view that the Corporation should in future finance the unit and collect contributions from other bodies relating to the benefits obtained from its work. The Treasury agreed, however, to reimburse the Corporation to the extent of 75 per cent for the year under review, estimated at £100,000.

Charges for equipment delivered to the Corporations and other operators included £2,117,792 for aircraft adapted from service types and delivered to B.O.A.C. in 1945-46. The credits for these aircraft totalled £513,000. Receipts for sale or hire of other aircraft totalled £3,811,239 in 1947-48.

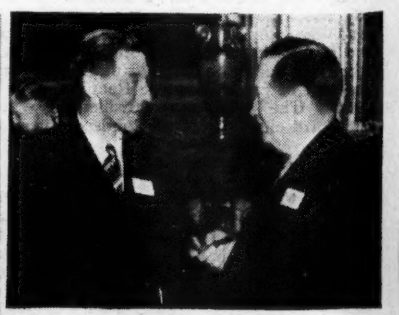
The report refers to aircraft which were sold at prices considerably less than the cost to the Ministry and others which were hired at rentals unlikely to repay the cost of the aircraft within their probable life. In 1946 a number of Vikings which cost £1,160,000 were hired to a Corporation and when taken out of service their rental earnings totalled less than £100,000. Some had since been sold for under one-eighth of their cost. Between December, 1946, and March, 1947, Ju-52s were reconditioned at a cost of nearly £10,000 each, hired at £20 a month each and taken out of service after a few months' use. In the same year some Lancastrians, priced at £42,000 each, were sold at £14,000 each and others were hired at £2,000 a year. Yorks priced at £50,000 each were also delivered and eventually bought outright at the agreed price of £17,500 each. The Auditor has addressed a number of enquiries to the Ministry on these and similar transactions, including a number of sales and hirings to foreign operators on terms which did not appear likely to cover the costs incurred by the Ministry.

On the establishment of the Air Registration Board in 1937 provision was made for meeting deficits for an initial period of five years as to one-fifth by the varous interested concerns (including operators, constructors and insurers) and as to four-fifths by the Air Ministry. This financial self-sufficiency had, however, never been achieved and in March, 1948, it was agreed that for the four years 1945 to 1949 the outside interests would contribute £27,600 and the Ministry the balance, estimated at about £225,000 of the Board's deficit.

First B.A.C.A. Conversazione

APPLYING the experiences of the early days of Lloyd's and the Baltic Exchange, the British Air Charter Association has started a regular calling-together of all its members for informal talks. The first quarterly gathering was held on Wednesday, March 9th, at Londonderry House, to which were invited also members of the Aerodrome Owners' Association and representatives of aircraft manufacturers. Charter companies which are not members of the association were also encouraged to be represented in order to make the meeting as beneficial as possible to civil aviation.

Mr. J. E. Rylands, chairman of the B.A.C.A., hoped that many more charter companies would join the Association, as he had no doubt in his mind that it was of real, practical use to its members and, in fact, had been of value to all independent air-charter operators. He referred to the number of occasions on which a B.A.C.A. delegation had been received by the Minister of Civil Aviation and how the Association had made the first move to obtain associate agreements for flying scheduled services. He looked forward to further achievement and considered that only such an Association was in a position to express satisfactorily the views of the independent operators in the international sphere; it was important that their opinions should be heard in I.C.A.O. As to the Civil Aviation Act, from the beginning the Association had impressed upon the Minister and the Ministry the unsatisfactory nature of the Act as it stood, and they would not be satisfied until it



Left: A group of "independents" at the B.A.C.A. first quarterly "get-together." Mr. T. W. Morton, Capt. G. P. Olley, Mr. J. E. Rylands, Mr. H. R. Gillman and Mr. C. C. Simpson. Above: W/C. N. H. Woodhead and Mr. W. N. Cumming in discussion.

was amended to give the independent operators the freedom that they deserved.

Mr. Rylands said that through the quarterly meetings it was hoped the charter operators would meet each other, their agents, the manufacturers and, in fact, everybody concerned with civil aviation to discuss ways and means of developing air transport.

He also referred to the waste and squandering which had been disclosed by the report of the Comptroller and Auditor General and he considered it was important to prove that through the independent air-transport companies air transport could be made to pay without subsidies. They were therefore entitled to a place in civil aviation in which they had freedom to develop.

Considerable interest was shown in an Auster five-seater twin-pusher project (powered by two Bombardiers), the drawings of which were brought by S/L. Porteous, chief test-pilot of the company.

A.T.C. Boxing Championships

THOSE who in past years have attended the Air Training Corps Boxing Championships at the Royal Albert Hall, London, have learned to expect an evening full of incident, broad with good humour and alive with enthusiasm. On Friday evening last, March 11th, the tradition was well maintained.

Cadet E. Davis, Winner of the "Flight" Cup.

With the programme of 17 bouts divided into junior and senior categories, the Southern champions (Red) won nine and the Northern champions (Blue) took eight, the Harewood Trophy for the Group gaining the greatest number of points in the finals being awarded to No. 65 (London) Reserve Group.

The opening contest, that for the *Flight* Cup, was fought between Cdt. E. Davis of 1223 (Caerphilly) Sqn. and Cdt. B. Hirst of 59 (Huddersfield) Sqn. This was a most spirited affair in which, although Hirst was somewhat the more aggressive, Davis, with a slight advantage in reach, remained the more collected; both lads were evidently tiring in the last round, but Davis's work, although but very slightly better than Hirst's, was sufficiently so to earn him the victory. In addition to the *Flight* Cup and a presentation desk plaque, Cadet Davis won himself a year's free subscription to *Flight*.

The Star Silver Wings Trophy, awarded to the Squadron with the greatest number of winners in the Southern finals, went this year to No. 1061 (Southwark) Sqn., whilst the Northern Wings, awarded similarly for the Northern finals, was won by No. 59 (Huddersfield) Sqn.

Special Awards

A. J. Elvin Cup for the best performance in the Championships.—Cdt. J. McGuire, 498 Wishaw (Northern). (Presented by Air Marshal Sir Hugh Saunders.)

Roy Limbert Cup for the best loser in the Championships.—Cdt. J. Lewis, 1061 Southwark (Southern). (Presented by Air Marshal Sir Leslie Hollinghurst.)

Harewood Trophy for the Group gaining the greatest number of points in the finals.—No. 65 (London) Reserve Group. (Presented by Air Chief Marshal Sir John Slessor.)

JUNIORS

Bout	Name	Squadron	Trophy	Presented by
7st midget ...	Cdt. E. Davis	1223 Caerphilly (Southern)	*Flight* Cup	C. B. Bailey-Watson
7st 7lb mosquito	Cdt. E. Flack	261 Guildford (Southern)	Sir Bertram Jones Cup	A. Cdre. Sydney Smith
8st flywt. ...	Cdt. R. Lawrence	1223 Caerphilly (Southern)	*Aeroplane* Trophy	Roland Dangerfield
8st 7lb bantamwt.	Cdt. J. McGuire	498 Wishaw (Northern)	Simon Marks Trophy	Air Marshal Sir Brian Baker
9st featherwt.	* Special Contest Cdt. P. Smith	59 Huddersfield (Northern)	*Aeronautics* Cup	Air Marshal Sir Alan Lees
9st 7lb lightwt.	Cdt. S. Ray	1061 Southwark (Southern)	Eland Cup	Donor, F/L. Miles
10st welterwt.	Cdt./Sgt. C. Mellinson	162 Stockport (Northern)	Chamier Cup	A. Cdre. Warrington Morris
10st 7lb middlewt.	Cdt. T. Maynard	296 Stoke Newington (Southern)	Bailey Cup	A. Cdre. Beamish
11st heavywt.	Cdt. J. Shannon	1061 Southwark (Southern)	Lord Londonderry Cup	W/C. Hanna

*Although Cdt. P. Smith lost the contest to Cdt. J. H. Jones, he was awarded the *Aeronautics* Cup on a walk-over, as Cdt. R. Callahan could not make the weight

SENIORS

Bout	Name	Squadron	Trophy	Presented by
8st flywt. ...	Cdt. F/Sgt. R. Millar	287 4th Edinburgh (Northern)	Lawley Cup	W/C. J. Lawson
8st 6lb bantamwt.	Cdt. D. Howard	1938 Salford (Northern)	Lord Glendyne Trophy	Rt. Rev. Bishop of Bermuda
9st featherwt.	Cdt. F. King	1061 Southwark (Southern)	Duncan Smith Trophy	Air Marshal Sir Whitworth-Jones
9st 9lb lightwt.	Cdt. F. Croucher	2170 Heswall (Northern)	*Air Reserve Gazette* Trophy	A. V-M. Lydford
10st 7lb welterwt.	Cdt. A. Brighton	24F West Cornwall (Southern)	Hilary Cup	Air Marshal the Hon. Sir Ralph Cochrane.
11st 6lb middlewt.	Cdt. T. Johnston	1134 W. Belfast (Northern)	Arthur Mack Cup	Lord Balfour of Inchyre
12st 7lb lt. hvywt.	Cdt./Cpl. K. Millson	103 Doncaster (Northern)	Sir Harry Price Cup	Air Marshal P. C. Livingstone
Heavywt. ...	Cdt./Sgt. A. Lamb	1031 Frome (Southern)	Robert Strauss Trophy	A. V-M. Sir Charles Longcroft

"... BUT STILL NOT ENOUGH"

THAT "a large number of first-class young fellows" were entering the Royal Air Force as flying personnel was pointed out last week by Air Chief Marshal Sir John C. Slessor (Commandant of the Imperial Defence College). "But," he added, "there are still not enough of them." He said that there were also keen volunteers to fly in the Auxiliary and Reserve forces, but there was a shortage of maintenance staff. A substantial increase in R.A.F. pay would assist recruiting, and it was also his opinion that recruiting was harmed by the disproportionate amount of publicity given to crashes. He paid a tribute to the work of unpaid helpers, such as A.T.C. officers.

Sir John was speaking to more than 200 guests assembled in the Grocers' Hall at a Livery Dinner of the Worshipful Company of Coachmakers and Coach Harness Makers of London. One of the most famous of the City livery companies, the Coachmakers (which received its Royal Charter in 1677) numbers among its members many of the leading figures in the aircraft and automobile industries and in the fighting Services.

Sir Frederick Handley Page, who is a Past Master of the company, spoke strongly of R.A.F. morale. "It is a damnable thing," he said "that anybody should say it is going down."

The Berlin Air Lift was, in his opinion, one of the greatest peacetime achievements ever carried out.

Other speakers at the dinner included Lt. Gen. R. N. Gale, of airborne operations fame.

SIR W. LINDSAY EVERARD

WITH the death, at the comparatively early age of 58, of Sir William Lindsay Everard British private flying has lost a good friend and a great champion. A member of a wealthy Leicestershire family of brewers, Lindsay Everard began quite early to take an interest in flying, and his private airfield near Ratcliffe Hall, his Leicestershire home, was the scene of many flying meetings in the years between the wars.

Both as an M.P. for Melton from 1924 to 1945, and as a private individual, he did much to encourage private and club flying. Among the many offices which he filled at various times was the chairmanship of the Royal Aero Club, and he was a vice-president of the Air League of the British Empire. He was Hon. Air Commodore of No. 605 (County of Warwick) Sqn., R.Aux.A.F., in which capacity he showed that his interest was not confined to private flying.

MORE ABOUT STATIC

An Accident Investigator's Views on Electrical Discharges

BY B. CORNTHWAITE

AN excellent article on static discharge,* published recently, contained a most lucid description of the mechanics of the phenomenon, but to anyone concerned with the commercial operation of aircraft it was a trifle depressing. If interpreted aright, the author's message was: "Dischargers at the extremities of the aircraft will reduce radio noise, but there is nothing known which will alleviate the unpleasant effect of lightning." He sugared the pill slightly by saying "There is no evidence that the effects of lightning on aircraft have ever been catastrophic."

If the approach to the problem is *via* pure electrical theory there can surely be no other conclusion; but is this the only approach?

Two years' study of the problem from the viewpoint of an accident investigator leads, possibly over-optimistically, to a much more cheerful conclusion, as it is felt that there are many factors which have not received their full share of attention and which might, if better understood, materially affect future design and/or operating policy.

That there is a definite and pressing need to do something to reduce the incidence and effects of the phenomenon few who have experienced them will doubt. Although it is agreed that no evidence of serious danger exists, it is very often a most alarming experience for both crew and passengers, and the cost of repairs and replacements can reach quite considerable proportions. Unfortunately, evidence tends to point to a definite increase in the nuisance value of these "strikes" and, if prognostications based on the results obtained by many research workers are anything like accurate, the increase will continue unless a really determined onslaught is made on the problem.

The first factor is aircraft type. There is sufficient evidence available to show that some aircraft are much more susceptible to lightning attack than are others. One airline which is operating three types of aircraft, two fairly similar and the third completely dissimilar, has some interesting figures to illustrate this point. Between December, 1946, and August, 1948, there were 47 reported cases of lightning-strike or static discharge, and they were shared out between the three types in the ratio of 40, 6 and 1, although the service-miles flown were almost equal. Figures have been quoted which appear to show that two such apparently similar aircraft as the DC-4 and the DC-6 have a quite different incidence rate. Again, although figures are not available, verbal evidence indicates that the Meteor and Vampire have very different incidence rates.

An Unknown Factor?

While it is agreed that this evidence is in no way definite or positive, surely it does give some indication that there is an unknown factor, which can be designed or built into an aircraft, that has a material bearing on the problem. An N.A.C.A. report states: "In brief, then, the potential gradient at certain favourable extremities will tend to be elevated to a greater extent on the large airplanes than the small ones, as a result of induction by external electrical fields. From this it may be concluded that physical reasons exist which tend to cause more frequent development of the artificial (sparking) potential gradient by large than by small aircraft under otherwise equal conditions."

In the case quoted above, the aircraft with a score of 40 is slightly smaller than the one with a score of 6!

A series of tests made with various finishes shows that, on balance, the lowest numerical charging rate (of either positive or negative sign) is obtained by using bare aluminium; this applies over a temperature range of 0 deg C to − 10 deg C.

The next factor is speed. Quoting American reports again, we have:—

(1) "The electrification of the higher-speed airplanes varies as about the third or fourth power of the speed."

(2) "When charging is caused by rain, snow, ice particles or dust, that is, friction with atmospheric particles, it is found that the charging is roughly proportional to the cube of the airspeed and to the frontal area of the aircraft."

(3) "It should be noted that the larger, faster and more numerous the propellers, and the larger and faster the aircraft, the more rapid is the rate at which it may produce and acquire charges."

Another significant factor would appear to be air temperature if the following quotation is accepted:—

"A total of 150 reports of disruptive discharges to aircraft with temperature data included were available for this study. Of this total 88 per cent (132 cases) occurred at temperatures of 5 deg C or lower. The temperatures concurrent with discharges fell with greatest frequency in the range −2.2 deg C to +1.6 deg C, since 59 per cent (88 cases) were concentrated within this range.

Some years ago an American airline reported that of 70 strikes reported on their aircraft, not one had occurred at an air temperature of over 10 deg C. More recently the writer has had the opportunity of studying reports at first hand and without doubt there appears to be a range between about −2 deg C and +5 deg C in which the majority of incidents occur. This may corroborate the result obtained by analysing the number of occurrences on a time-of-the-year basis, which placed the spring and autumn as the two peak periods; these are the seasons during which the temperature range quoted is probably encountered at the altitude at which most airline flying is done.

Effect of Altitude

Quoting yet again from an American report (judging purely from the available reports, most of the research on this subject has been done in America), the effect of altitude is mentioned as follows:—

"There is a general relationship between the sparking potential and the pressure in non-uniform fields, known as the principle of similitude. This principle states that for geometrically similar systems the sparking potential is a function only of the product of gas density and one of the linear dimensions of the system."

This means that as operating altitudes increase the problem of radio noise and corona discharge will become worse, for a given atmospheric electrical field and aircraft.

It may reasonably be argued that the foregoing paragraphs show insufficient differentiation between static discharge and lightning strike; but although that may be of major import to the electrical technologist, the airline operator, the crew and the passengers of an aircraft may be forgiven for classing them together under such respective headings as an expensive nuisance, an unnerving experience, and an unpleasant hazard associated with air travel.

There is no doubt that such occurrences are often expensive in replacement costs, increased inspection and maintenance costs and, sometimes, loss of revenue due to the time taken to effect the necessary repairs. It is undoubtedly alarming, as anyone who has experienced it will agree. It is impossible accurately to assess the loss of revenue sustained by airlines due to passengers having had such an experience and deciding in future to choose a mode of travel not subject to this phenomenon.

Having regard to all this, and with knowledge and experi-

* "Static Discharges from Aircraft," by W. A. Johnson, M.A. "Flight," February 24th, 1949.

ence as they are at present, is there any possible justification for accepting the dictum that "nothing can be done about it"? If the indications from the American research workers are accepted, the necessary conclusion is that, as aircraft get larger and fly higher, so will this problem become more acute. Is this not, then, the ideal time to learn from present-day experience, so that in future design, manufacture and operation of aircraft it will be possible materially to alleviate, or maybe one day completely eliminate, this nuisance? This is particularly important in view of projected schemes for using parts of the aircraft skin-plating as aerials.

Quite obviously such a study cannot be undertaken by an individual operator or even an individual country. If any headway is to be made at all, the problem must become the subject of a world-wide investigation. At the present moment one finds that most pilots are of the opinion that the whole thing is a perfectly natural occurrence—"it's not dangerous and there's nothing you can do about it, so why bother to report it?" On the other hand, it would be a reasonable gamble that if every incident anywhere in the world had been the subject of a comprehensive and accurate report, and if all these reports were available to a panel of investigators, there would be sufficient evidence on which to base some really effective modifications to aircraft or their operation.

The author of the article mentioned above suggested that use of the cloud-and-collision-warning radar device might enable pilots to dodge dangerous cloud formations. While the use of this device would undoubtedly lead to a reduction in the number of incidents it should be remembered that there are many reports of incidents occurring in apparently perfectly innocuous stratus formations.

To one who is a layman in radio matters, some modifications appear to be long overdue. They include such things as the total abolition of that ever-present nuisance, the trailing aerial; the provision of an effective earthing device for whip aerials; and the production of a static-discharging device which, while effectively and silently drawing off the charge, will not require constant maintenance.

The Anglo-American Conference

Twenty Papers Will Cover a Wide Field

THE second Anglo-American Aeronautical Conference is to take place in New York from May 23rd to June 4th. The first of these conferences, held jointly by the Royal Aeronautical Society and its American counterpart, the Institute of the Aeronautical Sciences, was held in London in 1947. This year the American society is organizing the conference.

The number of papers necessitates simultaneous reading of several in order to get through them in four days. The same procedure was followed here in 1947; it is an arrangement which has its drawbacks, in that there may be occasions when a delegate would like to attend two papers which are being read simultaneously. However, the subjects are so diverse that such clashes may not be very numerous, and the saving of time will enable a programme of visits after the technical conference to be carried out within the period set aside.

Visits to the following factories and establishments are planned: Langley Memorial Aeronautical Laboratory, Virginia; the U.S. Navy's Air Test Station, Patuxent, Md.; the Naval Aircraft Factory, Philadelphia; Republic Aviation Corporation; Grumman Aircraft Engineering Corporation; and Curtiss-Wright Corporation, Engine and Propeller Divisions.

The following papers are being presented:—

BRITISH

The Relative Merits of Auxiliary Power Systems:—
Hydraulic, by H. G. Conway (British Messier).
Electric, by R. H. Woodall (Rotax).
Pneumatic, by H. R. Haerle (Hymatic).

Turbine-engined Transport Aircraft, by G. R. Edwards (Vickers-Armstrongs).

Research on Helicopters at the R.A.E., with Special Reference to Stability of Multi-rotor Helicopters, by H. B. Squire (Royal Aircraft Establishment).

Materials from the Designer's Point of View, by A. E. Russell (Bristol Aeroplane Co.).

Operational Use of Propeller Gas-turbines, by F. M. Owner (Bristol Aeroplane Co.).

Application of Materials from the Manufacturer's Point of View, by Maj. P. L. Teed (Vickers-Armstrongs).

Relative Efficiencies of Large Landplanes and Flying Boats, by D. Keith-Lucas (Short Bros. and Harland).

Life of Aircraft Structures, by H. A. Wills (Council for Scientific and Industrial Research) (Australia).

Flutter Problems of High-speed Aircraft, by E. G. Broadbent (R.A.E.).

Operating Factors Affecting Design of Civil Aircraft, by C. Dykes (B.O.A.C.).

AMERICAN

Heat Transfer and Skin Friction for Isobaric Laminar Boundary Layers, by H. J. Stewart (California Institute of Technology).

Résumé of High-speed Aerodynamics, by Walter Vincenti (Ames Laboratory, N.A.C.A.).

Utilization Factors and Maintenance of Civil Aeroplanes, by Warren Albers (United Air Lines).

The Turboprop Engine, by W. G. Lundquist (Wright).

Recent Design Refinements in Turbojet Engines, by N. Burgess and J. C. Buechel (G.E.C.).

Aerodynamically Boosted Surface Control as Applied to the DC-6, by O. R. Dunn (Douglas).

Transonic Aerodynamic Results from Flight Testing of Dropped Bodies and Rocket Models, by F. L. Thompson (N.A.C.A.).

Operational Experience with Helicopters, by Clarence M. Belinn (Los Angeles Airways).

PATHFINDERS IN PEACE: *Marshals of the Royal Air Force Lord Trenchard and Lord Tedder were among the guests at the Pathfinder Association's dinner in London last Friday and they appealed in their speeches to members of the Association to help in educating the public to appreciate the needs of Bomber Command, and the R.A.F. in general, for men and material. In this photograph are seen (left to right) Mr. J. Johnston (Pathfinder Association), Viscount Trenchard, W/Cdr. J. C. MacGowan (Pathfinders, chairman), Lord Tedder, A. V.-M. D.C.T. Bennett (speaking) and G/C. D.F.E.C. Dean. A report of the gathering will appear next week.*

AIR SAFETY DEBATED

Some Contrasting Opinions on the R.Ae.S. Quartet of Lectures

MR. NORTH'S paper on *The Theoretical Aspects of Airworthiness and Safety* was the first of the four presented at the full-day Discussion on Air Safety held at the Royal Aeronautical Society, March 5th.* In thanking the lecturer for his contribution, the President of the Society, DR. H. ROXBEE COX, confessed that he had found the paper difficult to read, but his difficulty was due to the unfamiliarity of Mr. North's approach to a difficult problem. He felt, however, that by his exposition Mr. North had shown the advantage of the spoken over the written word.

In a contributed comment, read by Dr. D. M. A. Leggett, on Mr. North's paper, PROFESSOR A. TUSTIN, of Birmingham University, suggested that its subject-matter could best be understood and appreciated as an analysis of the nature of human judgment. Professor Tustin thought that the schematization of the problem as a "game" on a chequer-board seemed to be very close to the kind of process we habitually used in "judgments," and averred that much was to be gained from schematic representation if not too much was sought. What chiefly emerged was a clear understanding of why the problem was baffling, not an answer to it.

PROFESSOR A. A. HALL commented that Mr. North had used the language of statistics; of psychology and of physiology. He wondered if it was necessary to argue by analogy and in terms with which we were not entirely familiar, although he did not argue against cross-feeding between sciences. He was not certain that such matters could be discussed without risking the introduction of false analogies or unfamiliar false signs.

The matter, he said, was one of statistics and they could be a very bad master. For example, if the chance of being killed were one in two, that did not mean that one could be half-killed twice. From being half-killed twice one could recover, but it was not possible to recover after being killed. [To this Mr. North later replied that he would regard the half killed as being defined by the fact that the amount of dis-benefit, if it were multiplied, would be equivalent to that of one man killed.]

Prof. Hall said that things happened to aircraft long before they came to be treated statistically and, in consequence, it was wise to deal with statistical facts with a certain degree of care. Discussing aircraft reliability, Professor Hall said it carried two terms, one being the mean life, whilst the other, which was more important, was the spread over the mean life. He felt that they should take a great deal more trouble than they did about engineering tolerances, and there was more in it than just tolerances in respect of good fits, as the factors demanding tolerances were those which caused variation in life.

Commenting on Mr. North's theory of the "unique move" MR. J. R. WOMERSLEY said that having thought about what happened immediately before an accident, he did not consider that there was always a unique move. It could be appreciated in one or two sample cases, but where a multiplicity of means of avoiding an accident were presented, there might be an infinity of choices at the last moment.

Lessons from Accidents

PROFESSOR A. G. PUGSLEY expressed regret that the author of the paper did not enlarge on the empirical approach. Much of our work in this country had followed this approach until about ten years ago, using lessons drawn from one accident after another to build up a common law upon which were based the airworthiness requirements. The approach had continued to a lesser degree during the last ten years. He considered that they should make long-term judgment by studying a series of accidents instead of attaching too much significance to individual accidents. He thought that one of the main functions of an airworthiness authority was to investigate the cause and analyse experience. He also felt that although they had always endeavoured to disqualify the incompetent and dishonest a code of practice should be produced for the benefit of those who were less experienced in the manufacture of aircraft. He would prefer to see the airworthiness authority ensuring that aircraft were airworthy rather than that they were perfectly safe.

MR. N. E. ROWE was not sure that he understood the statement, made in the paper, that it was quite unreasonable to relate any qualities of an aircraft directly to risk of accident, because it seemed that if an aircraft had particular qualities of stability and control, or bad features in approach to land, the risk of accident in that aircraft might be very different from the risk in another.

In replying to other critics of his approach, MR. NORTH said that the human factor was predominant, that it was the centre, and that he did not think many such problems could be discussed except around the behaviour of the human being. Finally, he regarded it as very doubtful whether or not flying had become any safer in his lifetime. It had become much more enterprising and the great technical developments in aircraft seemed to be used to enable us to do more, rather than used to raise the standard of safety.

A. CDRE. VERNON BROWN, Chief Inspector of Accidents, opened the discussion which followed Dr. Bergin's lecture on *The Physiological Aspects of Air Safety*. He considered it one of the most interesting lectures he had heard and referred to difficulties between the wars in stimulating among doctors an active interest in flying—their services, he considered, could be very valuable in accident investigation. The Air Commodore thought that too little attention was paid to the effect of fear in the air, a subject which was not accepted for investigation in the Services. Fatigue, he said, was a cause for anxiety at all times. Another speaker suggested that pilots were more likely to succumb to fear under fatigue, and that their ability to overcome the condition could not be measured in normal circumstances.

Pilot Error

MR. SCOTT HALL, of the Ministry of Supply, referred to accidents attributed to errors of judgment, which he thought pointed to the need for high intelligence among pilots, with particular emphasis upon speed of reaction. DR. BARBOUR, of B.E.A., approved Dr. Bergin's appeal to designers but quoted losses in the first world war in which 90 per cent of the deaths were due to pilot error. He advocated that the other physical abilities of human beings should be used to relieve those faculties which were overworked and which caused fatigue. He agreed that designers were very much concerned in the safety factor and emphasized that the aircraft should be made to fit the pilot and that pilots should not be required to accustom themselves to different designs. The pilot remained the most important link in flying, but it was significant that he was examined only every six months.

MR. DICKSON defended the designer in his efforts to provide a standard cockpit layout and asked Dr. Bergin what, from the medical point of view, would be the best composition and type of lighting for helicopter operations, bearing in mind the procedure and technique adopted by the Helicopter Experimental Unit. DR. BERGIN later replied that single lights gave false impressions to pilots in the air. It was rather strange, he said, that an impression of movement always accompanied a single light; that condition could be abolished, however, by the use of several lights in different planes, or by interrupting vision through the installation of flashing lights which had the same effect as the pilot blinking his eyes.

In reply to the appeal (made in Captain James's Paper on *Air Safety from the Pilot's Point of View*) for adoption of a standard cockpit layout, MR. GEORGE EDWARDS, chief designer of Vickers Armstrongs, suggested that users should co-operate and decide on a standard layout, since designers were only too willing to conform. He also appreciated the necessity for sensitive reaction to controls. His personal experience of crash-proof tanks was one of considerable success and he knew of one positive case where lives had been saved through their installation. He thought, also, that every window should be an emergency exit and that passengers should face backwards.

Mr. Edwards could see no necessity for using combustion heaters in aircraft. It was better, he said, to use the heat from other sources. With reference to structural failures, he thought that there was equal danger, when landing in adverse conditions, through instrument failure. He also thought that we should get back to lower stalling speeds and consequent low landing speeds. The greatest difficulty was economic in that the users wanted all the advantages and were not willing to forsake payload. Development of the turbine engine was a measure towards safety, he thought.

MR. MARCUS LANGLEY raised an interesting point by asking the Inspector of Accidents for a definition of pilot error since he thought it could be an engineer's "let out." He suggested

* Abstracts of the four papers appeared in last week's issue of *Flight*.

Air Safety Debated . . . . .

that when a pilot stalled an aircraft it was considered to be the pilot's fault whereas the blame might be laid on the designer for the stalling speed being so high. He thought that many accidents were "built-into the aircraft," in the early days of design, by junior draughtsmen. Detailed design could be overlooked by senior designers and project engineers in their other anxieties, and junior draughtsmen were apt to make mistakes through inexperience.

DR. ROXBEE COX referred to Dr. Bergin's statement that hearing acuity could be safeguarded by the use of proper helmets and asked if this faculty was not given too much prominence. He wondered whether there was a quicker reaction by sight, hearing or feeling. DR. BERGIN said that at the moment visual aids were better than auditory ones but we had to be careful that the pilots did not succumb to overloading.

In discussing Dr. Bell's contribution on Traffic Control, MR. PETER MASEFIELD said that the economics of air transport were bound up with safety. They had to look forward, he said, to mixing jet aircraft with other types and referred to air traffic control for the Berlin airlift which was achieved through the introduction of "block" speeds. There was also the practical problem of cheating on timetables, since it had become the habit for some airlines to make fictitious schedules to ensure an early landing after arrival at destination. Responsibility for the pilot should be reduced during let-down and approach and they must try, he said, to develop monitored, automatic approaches from long distances. MR. SCOTT HALL agreed with this view and suggested that the instrument industry should be enlisted to help; he thought the Royal Aeronautical Society could make a great contribution by sending special invitations to instrument firms on such occasions as these discussions on air safety.

General Discussion

In reply to various questions Dr. Bergin confessed that as yet there was no method of assessing good or bad pilots on selection but as a rough sieve there were certain unsuitable elements which could be eliminated. Certain personality traits contributed to good captaincy. He agreed with Mr. Masefield that automatic flying was desirable, particularly in adverse conditions, but he suggested that in the event of an emergency a pilot's reaction was slower when the aircraft was under automatic control than when the pilot was flying it himself.

In answer to an earlier suggestion from Dr. Roxbee Cox that aircraft should be designed to give similar reactions to control, Capt. James thought that it was asking for the impossible and that pilots would be happy for a standard cockpit layout. Dr. Bell thought that it would be possible to mix jets and normal aircraft in the air traffic pattern provided the controller knew accurately the position of each aircraft. With regard to timetable cheating, he thought there was only a coincidental connection between timetables and actual times of arrival; he considered that another and more dangerous form of cheating was the habit of making a deliberately erroneous E.T.A. in flight to obtain earlier landing.

Mr. D. Barnet, a member of R.A.F. Transport Command, thought the heart of the problem lay in reducing holding time in which one of the most important contributory factors would be the development of precision instrumentation and equipment. The benefit of landing aids would be largely lost if precision co-ordination could not be obtained. An ideal system of guidance would provide a ground controller with a continuous indication of the track, height and speed of each aircraft in one piece of equipment.

Dr. Bell then stated that if the safe landing interval were to be reduced to the minimum, it could not be hoped that navigation accuracy would keep pace. Every reduction in landing interval required a corresponding improvement in navigation.

Magical Mathematics

Mr. R. H. Hardingham, referring to Mr. North's Paper deplored the tendency to employ mathematics to explain everything and, worse still, to be satisfied with the answers. He felt that Mr. North's theories on the relationships between airworthiness and safety provided a subjective rather than an objective exposition and, on the basis of experience and the test of time, theories would no doubt become resolved into the terms of practical procedure. He thought that the aircraft in its present form presented a formidable task to any authority concerned with safeguarding air travel, and airworthiness authorities were reluctantly obliged to extend their spheres of influence to combat the potential dangers inherent in the ever-increasing complexity of the aircraft. The requirements issued from time to time by the A.R.B. had been vetted by every branch of the aircraft industry and thus they reflected the influence of a body comprising contractors, operators, insurers and other interested parties. It was not a soulless body enforcing its will and requirements on the designer, but the Board treated its requirements as a yardstick against which the merits of a non-conforming aircraft could be judged.

Mr. Lawrence suggested that if pilots were unable to cope with the inherent deficiencies of the aircraft then they should not be in any category higher than the drivers of other transport vehicles. He was reminded by Captain James of the decisions which a pilot had to make on his own and with little information to guide him.

Dr. Roxbee Cox, in winding up the discussion, referred to one of the questions which had remained unanswered. It had been suggested that as so many people preferred to cross the Atlantic by the *Queen Mary*, we should find out what passengers required from air travel. The result might encourage the use of safer and more comfortable aircraft.

DOROTHY SPICER MEMORIAL FUND

THE Society of Licensed Aircraft Engineers announces a further list of subscribers to the Dorothy Spicer Memorial Fund.

Names in this list, the second, are: W. J. Andrews; Miss C. R. Ash; Birkett Air Service, Ltd.; Essex Aero, Ltd.; Fairey Aviation Co., Ltd.; Gatwick Branch, S.L.A.E.; Guild of Air Pilots and Navigators of the British Empire; D. W. Richardson; Saunders-Roe, Ltd., Lady Handley Spicer.

D.H.-AIRSPEED DEVELOPMENTS

AS series production of the Airspeed Ambassador draws near, still closer integration between its makers and the parent de Havilland enterprise is announced.

Major Hereward de Havilland, D.S.O., has joined the board, and will be joint managing director with Mr. J. Liddell, who has been the financial director of the Airspeed Company since 1940. They will share responsibility for administration, leaving Mr. A. Townsley (works director) free to devote all his attention to the increasing production activities. Major Hereward de Havilland, who was a Farnborough test pilot in 1913, has retained an intensely practical attitude to aviation, and in the course of the past 30 years has visited almost every part of the world in the interests of the D.H. companies.

Mr. J. Liddell. *Maj. H. de Havilland.*

In view of his widening field of interests in this country and overseas, Mr. A. S. Butler is relinquishing his chairmanship of the Airspeed directorate; he will be succeeded by Mr. W. E. Nixon, managing director of the parent company.

***BRISTOL VISIT:** Mr. Chanda, Dep. High Commissioner for India, discusses the Brabazon with Mr. F. C. Chard, Bristol's production engineer. On the right is G/C. Singh, Air Advisor.*

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

CAST-OFF TRAINERS
—wanted by Clubs

THE Percival Prentice has now superseded the Tiger Moth as the standard R.A.F. basic trainer. The latter valuable training machines are now surplus to Service requirements, so why not, therefore, distribute them (free of cost) to our flying clubs and groups? The worn out types could be put to good use as spares, whilst airworthy machines would be employed as training aircraft. Most "club types" would be only too willing to collect these aircraft from various dumps. If this scheme is put into operation within a few months, most of the Tiger Moths would have the necessary permit to fly, this being sufficient for a single delivery flight. By releasing these aircraft now, the Air Ministry would be making an excellent contribution to our clubs, which are still feeling the pinch without a subsidy. LEWIS G. COOPER.

Coventry.

[In a letter in *Flight* of March 3rd the organizer of the R.N.V.S.R. Air Section related how he had almost negotiated the acquisition of six Tiger Moths when the Admiralty vetoed the idea on the grounds that these aircraft were of no training value for Naval Aviation.—ED.]

AUTOMATIC DISTRESS-CALLS
A Proposal that Fell on Stony Ground

I HAVE read with interest the letter from Mr. G. S. Orchard, published in your issue of February 24th, in which he proposes a radio "tell-tale" of aircraft disasters which occur while flying across great stretches of ocean.

The proposal he makes is identical with one which I submitted to the Ministry of Civil Aviation in March, 1947. My proposal was that long-range aircraft should carry a miniature radio transmitter, into which, at intervals, the navigator would feed the co-ordinates of the aircraft's position. In the event of ditching, an alarm button would cause the transmitter, together with a parachute or balloon, to be ejected, and while it remained suspended over the ocean it would transmit the call-sign of the aircraft together with the co-ordinates of the last position fed into it.

I am in entire agreement with Mr. Orchard that such a device would be of immeasurable value when dealing with disasters such as those of the B.S.A.A. Tudors. The cost of installing the devices in all long-range aircraft would be offset by the great reduction in the expense of searching wide areas of ocean for one aircraft when it disappeared. Apart from these economical factors, there would be a very much greater chance of locating any passengers who might have survived the ditching and have taken to dinghies.

When the project was submitted to the Ministry of Civil Aviation in 1947 there was a slight amount of interest shown, but this quickly vanished and, as far as I know, no efforts have been made to follow up the proposal and convert it to a practical proposition. E. FENNESSY.

London, S.W.9.

SOARING FLIGHT
The Technique of Storks

POSSIBLY some of your gliding enthusiasts might be interested in the technique used by soaring storks in the absence of thermal currents, when they employ the wind only for ascent. The following was observed in the early morning after rain in Rhodesia, in the presence of a fairly steady breeze of about 15 m.p.h., and in flat country free from the large exposed granite masses or ploughed land which commonly give rise to thermal currents.

A large flight of storks was observed to take off in flapping flight to a height of about 50ft, and thereafter to soar without a single flap completely out of sight. The flight-path was completely different from the steady circular path which they use in the presence of thermal currents, being semi-elliptic, with the major axis of the ellipse in the direction of the wind and the upwind turn very much tighter than the downwind one. The upwind part of the circuit was a relatively steep decelerating climb, and the birds appeared very nearly to stall on the turn. The downwind flight was a descending, longer, accelerating and flatter path, but never quite down to the previous point of descent, so that there was a gain in height at each circuit.

The downward accelerating flight was on a considerably wider arc than the upward climb. In practice, of course, the ascent was curved, starting steep and finishing flat, as was the descent. C. H. A. JOHNSON.

London, S.W.1.

FIRST "HEAVIER-THAN-AIR"
Which Squadron ?

I HAVE been waiting for a reply from No. 2 Squadron in answer to "C. R. L." when he asks (February 24th): "Will no one in the Squadron to-day fight for their honour?" I had expected instant results, as I know they are pretty touchy about No. 3 Squadron's claim to be "Britain's premier Squadron," or at least they were when I reluctantly left them in December, 1948.

From the point of view of morale and Squadron spirit, No. 2 can't be beaten, and all the newspaper stuff about the lack of these qualities is to me, who has just left such a first-class unit, hard to believe.

However, to revert to the main subject, the whole thing seems to rest on what you mean by the word "premier." Nos. 2 and 3 Squadrons were both formed in May, 1912, but No. 3 was disbanded in 1919 and not re-formed until 1924, whereas No. 2 was "out" for only 11 days in 1920, so No. 3 certainly doesn't score on length of service.

On one point, however, I can comfort "C. R. L.": No. 1 Squadron was not the first to fly an aeroplane, as they had balloons until 1914, and Colin Macfie, the present C.O. of No. 3, can bear me out in this, as he is an ex-C.O. of No. 1 Squadron.

In conclusion, I note that the Editor states that it is *Flight's* desire only to be accurate, and I assume, therefore, that he has "historic authority" for *Flight's* statement about No. 3. I would, however, like to refer him to Brett's *History of British Aviation*. On page 117 of Volume II appears the following, in reference to a journey made by No. 2 Squadron from Montrose to Netheravon in May, 1914: "This premier Squadron of the R.F.C. was now completely equipped with B.E. tractor biplanes. . . ." G. COLLINSON, S/L.

Hendon, Middx.

Another Claim for No. 2

THE book *The War in the Air* (Vol. 1), by Sir Walter Raleigh, states that when the R.F.C. was formed in May, 1912, it absorbed the two companies of the "Air Battalion." No. 1 Company became No. 1 Airship Squadron. No. 2 Squadron was formed from the officers and men at Farnborough. No. 3 Squadron was formed from the remainder left at Larkhill, and Capt. Brooke-Popham was sent from Farnborough to command it.

How does this make No. 3 Squadron the first "aeroplane" squadron?

Let *Flight* print the history of the senior squadron, No. 2. It has always been an "army squadron," never a fighter squadron. But what a history! First to move as a unit—Farnborough to Montrose; first across the Irish Sea; first aircraft to land in France, 1914; first air V.C.—Lt. Rhodes-Moorhouse, May, 1915. AIR GUNNER,

Hull. No. 2 Squadron, 1935-1941.

[Our statements regarding squadron priority are based on the authority of **Raleigh's** *War in the Air*, which was written from official documents by direction of the Historical Section of the Committee of Imperial Defence. The pertinent passage appears on page 217, vol. 1:—

"Towards the end of April Captain H. R. M. Brooke-Popham took over from Captain Fulton the command of the old aeroplane company on Salisbury Plain, and on the 13th of May, when the Royal Flying Corps was formed, this company became No. 3 Squadron of the new formation. No. 2 Squadron was formed from the nucleus of aeroplane pilots at Farnborough, and was placed under the command of Captain C. J. Burke."

It must be emphasized, however, that we have used the word "premier" entirely in its chronological sense and that no comparison of quality is implied.—ED.]

SERVICE AVIATION

Royal Air Force and Naval Aviation News and Announcements

TRAINER FROM WEYBRIDGE: An artist's impression of the Vickers 648 shows how it differs from the Valetta transport in undercarriage layout and fuselage form. The revised nacelles are also distinctive.

Vickers Trainer

AS the drawing on this page shows, the new Vickers 648 operational trainer is directly descended from the Valetta transport, and differences between the two are mainly functional. This similarity is evidence of the economical and delay-saving policy of employing proven design features to the full.

The most important alteration is the trainer's forward-folding nosewheel undercarriage, with double wheels on all three oleo legs. Its hydraulic nosewheel-steering and undercarriage-door retraction have been adapted from those designed for the Viscount. Both bomb-bay and bomb-aimer's position are accommodated in a large external bulge beneath the fuselage.

The trainer retains the Viking-type tail cone, which disappeared from the Valetta to permit installation of a glider-towing hook. Fuselage length has been increased from 65ft 2in to 67ft 6in, and the wing span of the T.1 is 94ft 11in, compared with the 89ft 3in span of the Valetta. The two Bristol Hercules power plants are enclosed by re-designed nacelles and cowlings which simplify servicing.

Chipmunks for the Reserve

THE question of replacing the Tiger Moths of the R.A.F.V.R. has finally been settled by a Ministry of Supply order for an unspecified number of de Havilland Chipmunks. It may be assumed that, as standard aircraft of the Reserve Flying Schools, hundreds of Chipmunks will eventually come into service to give both refresher experience to members of the V.R., and—as the force expands—*ab initio* instruction to its future recruits.

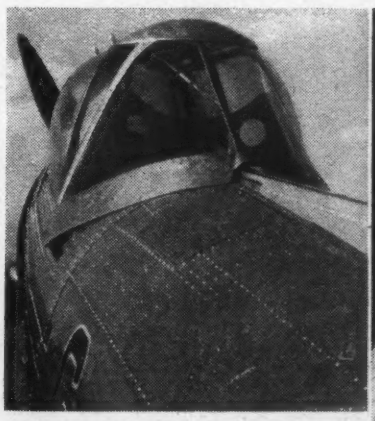
Certain modifications, meeting R.A.F. requirements, will be made to the original design, which was described in detail by *Flight* on August 21st, 1947. In addition to the alterations shown in the accompanying illustrations, amber screens, which can be quickly fitted in the air, are provided. STR9 V.H.F. radio installed in the front instrument panel gives inter-comm. by means of a press-to-mute switch. Full night-flying equipment is specified. The undercarriage is situated 3in farther forward to compensate for the slightly increased weight of the 1,45 h.p. D.H. Gipsy Major 10, which replaces the Gipsy Major I.

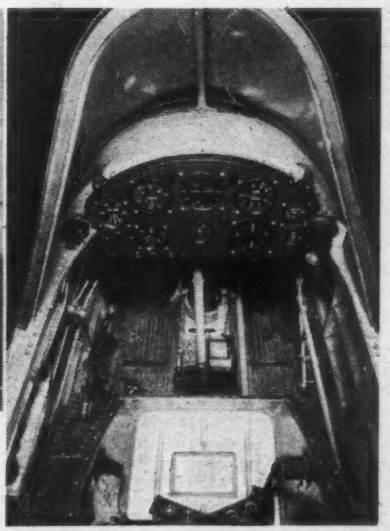
Long-Range Lancasters

A HIGH-ALTITUDE sortie of 1,625 miles to Castel Benito forms the first leg of a 7,000-mile navigational training flight to Khartoum and back by six Lancasters of the R.A.F. Empire Air Navigation School, Shawbury, which was due to begin at 2000 hr last Tuesday. A similar sortie was to constitute the second leg of the outward journey, which was to be completed the following night, navigating entirely by "Astro" and dead reckoning.

It is intended that the aircraft shall return home from Khartoum on Friday via Fayid, in the Canal Zone, and Luqa, Malta, spending a day at each.

The flights will provide an opportunity for practising experimental navigation techniques, including the use of pre-computed graphs, the grid system instead of latitude and longitude charts, and pressure-pattern flying.





CHANGED CHIPMUNK: In service, this trainer will have the modified hood shown, with increased vision for the instructor. The instrument panel now has full blind-flying equipment.

Auxiliary Appointments

APPOINTMENTS of commanding officers for three fighter-control units of the Royal Auxiliary Air Force have been announced by the Air Ministry.

G/C. R. H. Scott, who is to command No. 3502 (Ulster) F.C.U., located at Tyrone House, Belfast, joined the A.A.F., as it was then styled, as a pilot officer with No. 604 Squadron in 1937. He transferred to fighter-control duties in 1941, and later served in the Middle East and Mediterranean on signals and radar work for three years. When released from the Service in September, 1945, he was at Fighter Command H.Q.

The new C.O. of No. 3605 (County of Warwick) F.C.U., W/C. G. E. Race, joined the R.A.F. in 1940 as an air gunner, later transferring to the operations room at Biggin Hill. He served as a controller at Peterhead, Biggin Hill, and Honiley before his release in 1945. His command is situated at Castle Bromwich, near Birmingham.

No. 3511 (City of Dundee) F.C.U., which is located at the T.A.F.A. H.Q., Perth Rd., Dundee, is to be commanded

Service Aviation . . . . .

by S/L. I. McT. Ramsay, who was commissioned in September, 1940, after serving as a sergeant pilot in the pre-war R.A.F.V.R. During the war he flew with No. 272 Squadron in the Middle East, after spending two years as a flying instructor.

The Other Lift

ALL ranks of the R.A.F. Mediterranean and Middle East Command who have been participating in the air operations to relieve famine in Hadhramaut, Arabia, have been congratulated in a message sent by the Chief of Air Staff, Lord Tedder, to Air Marshal Sir William Dickson, their A.O.C-in-C. Lord Tedder referred to "another unexpected job well done without fuss or bother," and his message concluded "good show." In a month, R.A.F. Dakotas dropped over 750 tons of grain to 80,000 Arabs faced with starvation through crop failure.

R.A.F. Golf

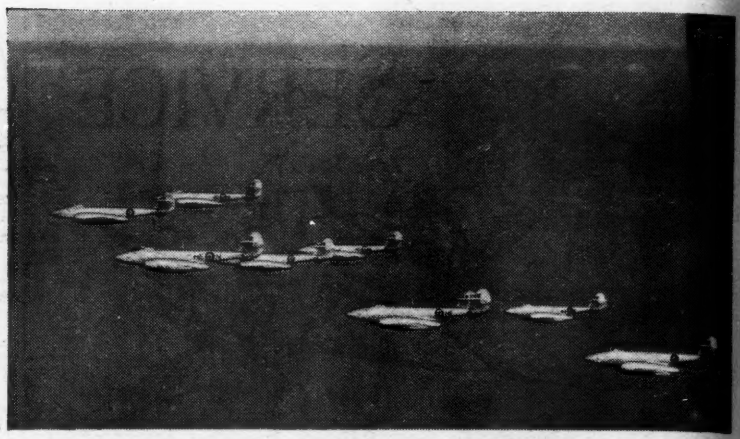
FIXTURES for the R.A.F. Golfing Society have been announced. The spring meeting will be held at the Berkshire Golf Club, Ascot, on April 26th, 27th and 28th; the Moor Park Club, Herts, will be the scene of the summer meeting on July 1st, and the three-day autumn meeting will begin on September 6th at Walton Heath. The Ladies' Section (formerly the W.R.A.F. Golfing Society) will play its championship at the autumn meeting. From Air Headquarters, Iraq, it is learned that the R.A.F. Golf Club at Habbaniya has been re-formed, and a new nine-hole course opened.

KEY MEN : On a recent visit to London, General Hoyt Vandenberg, the U.S. Chief of Air Staff (left), was met by his "opposite number," Lord Tedder, and the Secretary of State for Air, Mr. Arthur Henderson, with whom he is seen in this photograph.

Northern Air Display

A FULL-SCALE air display is now being organized by No. 613 (City of Manchester) Squadron, R.Aux.A.F., in conjunction with A. V. Roe & Co., Ltd. Sir Roy Dobson, managing director of Avro, and Honorary Air Commodore of the Squadron, has placed the company's airfield at Woodford at the disposal of "613" for the display, which will be held in the afternoon of Saturday, April 30th.

The organizers hope that the display will be representative of both the R.A.F. and the aircraft industry, and that it will rank with the best ever held in this country.



FORMIDABLE FORMATION : A squadron of Fighter Command Meteor 4s at altitude. R.A.F. units equipped with these hard-hitting intercepters are the core of Britain's air defence system.

Shackleton Flies

THE Avro Shackleton, a maritime reconnaissance bomber powered by four Rolls-Royce Griffons, made its first flight at Woodford on Wednesday of last week. Mr. "Jimmy" Orrell, Avro's chief test pilot, flew the aircraft, which was in the air for 33 minutes.

First Auxiliary Rejoins

THE first recruit to join the Auxiliary Air Force when it began forming in 1925, Mr. W. J. Warrell, has now applied to re-enter the force, as a member of No. 2604 (County of Middlesex) Light A.A. Squadron, R.Aux.A.F. Regiment. Between 1925 and 1929 he served with No. 600 Squadron, then a bomber unit, as a fitter, before transferring to the Territorial Army until 1934.

He entered the R.A.F. in 1941 and served as a nursing orderly until released in 1945. Although Mr. Warrell is now 44, which is six years over age, he intends to continue working as a nursing orderly during spare-time service with No. 2604 Squadron.

Benevolence

THE R.A.F. Benevolent Fund has received £5,439 as a result of the "At Home" day, during Battle of Britain Week, when 81 R.A.F. airfields were opened to the public. Admission was free, but proceeds from car-park charges, collecting boxes and side-shows have now been divided equally between the Fund and the R.A.F. Association. Church of England collections on R.A.F. stations last year brought the Fund £372, while R.A.F.A. branch activities during Battle of Britain Week realized a further £6,700. A series of auction sales held at the R.A.F. Central Depository, Hornchurch, has raised over £1,000. Items sold consisted of the personal effects of deceased airmen, and property mislaid by members of the R.A.F. in all parts of the world.

R.A.F. Permanent Commissions

GENERAL DUTIES BRANCH.

Squadron Leaders: C. R. Hill, D.F.C., R. J. Neal, D.F.C., N. S. Petch, J. B. Robertson.

Flight Lieutenants: F. J. Belfitt, D.F.M., J. A. Bland, R. L. E. Burton, J. J. Canning, D.F.C., D. E. Cooke, F. C. Cooke, D.F.C., W. C. P. Cory, D. M. Finn, D.F.C., A. H. Fryer, L. C. Griffiths, D.F.C., T. M. Hay, L. J. Hill, J. K. Holt, J. L. Lilburn, M. J. Lloyd, W. S. Mockford, J. Niven, D.F.C., M. Penman, D.F.M., E. N. Simmons, G. H. Sizer, F. W. Sledmere, R. W. Steel.

Flying Officers: W. G. George, A. G. Scott.

TECHNICAL BRANCH.

Flight Lieutenants: A. G. Ayre, J. Crane, T. Cross, W. Edwards, G. A. Henderson, M. Herniston, F. A. Houghton, F. C. Lowe, V. R. Lucarotti, R. G. J. Lynch, M.B.E., W. H. Robinson, D.F.C., D.F.M., A. J. H. Sammels, R. Stephens, A. C. Whitfield, M.B.E., D. Wilkinson.

Flying Officers: T. E. Allison, M. B. Faraday, D. L. F. Hayward, B. A. Jones, M. E. Le Galle, T. A. Poyntz, J. Sproson, E. A. N. Webb, P. Woolley.

EQUIPMENT BRANCH.

Squadron Leader: D. R. Parkinson.

Flying Officer: R. J. Lockyer.

SECRETARIAL BRANCH.

Wing Commander: F. J. Taylor, C.B.E.

Squadron Leaders: J. G. E. Horne, O.B.E., W. J. Marshall, M.B.E., W. W. Watson, O.B.E.

Flight Lieutenants: D. Driscoll, J. G. Featherstone, A. MacLeod, A. McNally.

Flying Officers: T. J. Bishop, D.F.C., F. W. G. Braisher, E. R. Simmons.

R.A.F. REGIMENT.

Flight Lieutenant: O. L. Browne, D.F.C.

AIRCRAFT CONTROL BRANCH.

Squadron Leader: J. R. Blackburn.

Flight Lieutenant: J. B. M. Stapleford.

Flying Officers: F. G. Budd, A. R. Daw.

PROVOST BRANCH.

Flight Lieutenants: F. W. Kendrick, L. W. C. Lewis, R. C. Mawer, H. Taswell.

Flying Officer: E. Booth.

CATERING BRANCH.

Squadron Leader: H Fallows.

Reunions

THE second annual reunion of No. 3 B.F.T.S. (R.A.F.), late of Miami, Oklahoma, will be held at the connaught Rooms, London, on May 29th. Tickets 17s 6d (stag) from H. V. D. Hallett, 142, Southampton Road, Eastleigh, Hants.

* * *

Former members of No. 1 A.R.S., R.A.F. Heliopolis, 1942-46, interested in a reunion are asked to contact F. Neighbour, 72, Raglan Gardens, Oxhey, Watford, Herts.